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1. GENERAL ASPECTS

1.1. History

3066. Radiation injuries before 1925 - Vacirca S.J. - State Univ. New York, Downstate Med. Cent., Brooklyn, N.Y. - RADIOL.TECHNOL. 1968 39/6 (347-352)

The subject of radiation protection has recently been dramatized in the public press and discussed in Congressional committee hearings. Trained medical personnel have been acutely aware of the potential hazards inherent in the use and manipulation of x rays, radium and other radioactive materials, but most of severe radiation damage described in this article. This is a grim reminder of the past and a challenge for the future to maintain meticulous practices of radiation for the benefit of those who work in the field and the patients they serve.

3067. The early history of amplitude modulation, sidebands and frequency division multiplex - Tucker D.G. - Dept. Electron. Electr. Engin., Univ., Birmingham - RADIO ELECTRON.ENGINEER 1971 41/1 (43-47)

It is shown that the ideas of f.d.m. originated with Alexander Graham Bell around 1870 and were formulated as an f.d.m. telephone system by Leblanc in 1886. Amplitude modulation of a carrier by speech probably originated also with Leblanc in 1886. The existence of sidebands (or sidetones) was demonstrated experimentally by Mayer in 1875 and theoretically by Rayleigh in 1894, but was not known to the early radio and telephone engineers, being apparently rediscovered in 1915. The main developments up to about 1920 are briefly discussed.

1.2. Components

3068. Study of a new resorbable synthetic suturing material (Dexon) - ETUDE D'UN NOUVEAU MATERIEL DE SUTURE SYNTHETIQUE RESORBABLE (DEXON) - De Buren N. - Serv. Chir., Hop. Providence, Neuchatel - HELV.CHIR.ACTA 1970 37/6 (616-617)

Dexon is a unique polyglycolic acid suture. It is absorbable like catgut but provokes less tissue reaction and it has higher tensile strength and handling properties, similar to silk.

3069. Heparinized polyester fibers - Hersh L.S., Weetall H.H. and Brown Jr I.W. - Res. Developm. Labs, Corning, N.Y. 14830 - J.BIOMED.MAT.RES. 1971 5/2 (99-104)

Two methods have been developed to heparinize polyester fibers. One approach involves a thermofixation process. In this process, a water insoluble complex of heparin is 'fixed' into the bulk of the polyester fiber by the application of heat. The second method uses an amino silane coupling agent. The heparin molecule is ionically bonded to the protonated primary amine. Both processes yield a heparinized fiber which maintains a high level of heparin in contact with NaCl solutions. The thermofixation method has been used to treat several Dacron vascular prostheses (10 mm OD) which have been implanted into the inferior venae cavae of dogs. These preliminary in vivo studies indicate that heparinized polyester fibers result in a vascular prosthesis with increased resistance to blood clotting. One 10 mm OD prosthesis has remained open for more than 9 mth.

3070. Quartz and graphite filament reinforced polymer composites for orthopedic surgical application - Musikant S. - Gen. Electric Co., Space Technol. Cent., Reentry Environm. Syst. Div., Philadelphia, Pa. 19101 - J.BIOMED.MAT.RES. 1971 5/2 (225-235)

Materials conventionally used for orthopedic surgical implants are primarily metallic alloys such as stainless steel 316L, Cr Co Mo alloys and recently titanium and Ti 6A1 4V alloy. Modulus of elasticity of these (E = 15 to 30 x 10^6 psi) is an order of magnitude higher than that of bone (approx. 3 x 10^6 psi). Quartz filament reinforced composites were formulated with E = 6 x 10^6 psi and flexural stress at rupture (modulus of rupture) of approx. 200,000 psi. Similarly graphite filament reinforced epoxy composites were formulated with E = 16 x 10^6 psi and flexural stress at rupture (modulus of rupture) of approximately 200,000 psi. Specimens of these materials were implanted in white rats subcutaneously. At sacrifice 90 days after implantation there was no evidence of any inflammatory process, although the implants were completely encapsulated. (Similar in vivo compatibility tests in rabbit muscle tissue are currently in progress.) No significant changes in mechanical properties could be measured in the implants after the 90 day period of implantation. By adjusting the volume fraction of fibers in a given composite, the modulus of elasticity can be adjusted (with concomitant variations in strength) to meet the biomechanical and dynamic requirements of the appliance.

3071. Composite resins as a dental restorative material - Johnson L.N. - Fac. Dent., Univ. Western Ontario, London, Ont. - J.BIOMED.MAT.RES. 1971 5/2 (207-223)

The objective of this study was to assess the finished surfaces of various dental composite resin restorative materials using common rotating abrasive devices and diamond and iron carbide dental burs. The "finished" surfaces were compared with surfaces created by a polyester matrix band. The "finished" composite resin materials were also compared with filled resins as well as the unfilled polymethyl methacrylate resin. Evaluation of the various finishing procedures was made from scanning electron micrographs. Results indicated that "finished" resins, both filled and composite, departed greatly from an acceptable polished surface and that the use of any resin filled with glass rods would be contraindicated.

3072. Implantable impermeable flexible encapsulants for artificial organs - Enger C.C. and Rhinelander F.W. - Biomed. Engin. Lab., Dept. Surg., Case Western Reserve Univ. Sch. Med., Cleveland, Ohio - J.BIOMED.MAT.RES. 1971 5/2 (149-168)

These studies have furthered the development of a flexible impermeable encapsulant for implantable electronic devices. Medical grade silicone rubber, a widely used implantable material, is well known to be permeable to water vapor. The authors demonstrated that silicone rubber is apparently permeated by electrolytes. This permeability to electrolytes can be blocked by impregnation of the silicone rubber with certain naturally occurring waxes during vulcanization. Implantation into living tissue has shown this material to be well tolerated. Of the natural waxes studied thus far, spermaceti has revealed the best overall properties as an impregnant for silicone rubber.

3073. Structure and mechanical properties of materials - Williams D.F. - Dept. Orthop. Surg., Univ. Liverpool - BIO-MED.ENGINEERING 1971 6/2 (62-69)

This five part series is intended for clinicians and biomedical engineers who work with prostheses but have no formal training in materials science. The first part deals with the relationships between structure and mechanical properties in metals, polymers and ceramics. Parts 2 and 3 concern the degradation of materials and the effects of materials on biological environments. In part 4, new materials are discussed in relation to possible biomedical uses, and the series will conclude in part 5 with a description of selected manufacturing processes and a summary of all factors influencing the choice of materials.

3074. Hydron coated terylene sutures: A pilot study - Singh M.P. and Melrose D.G. - Nuffield Unit Clin. Physiol., Dept. Surg., Roy. Postgrad. Med. Sch., London - BIO MED.ENGINEERING 1971 6/4 (157-159)

Surgical sutures made of terylene commonly provoke both a foreign body reaction in the tissue and the formation of blood clots (thrombosis). In trials on dogs the polymer Hydron was used to coat terylene sutures. Although this was a small series, results suggest that the coating almost eliminates these unfavourable reactions, and that the use of similarly coated sutures might enable wounds to heal better and small blood vessels to be sutured without the risk of their becoming blocked.

3075. Color in plasma opens new doors - ELECTRONICS 1971 44/6 (31-32)

Plasma display panels are getting a new look color. With such a capability, the panels may find applications in aircraft instrumentation, data terminals, and so on.

3076. Electrolytic capacitors - Campbell D.S. - Plessey Co. Ltd., Components Group, T.C.C. Capacitor Div., Whiteside Works, Bathgate, Edinburgh - RADIO ELECTRON.ENGINEER 1971 41/1 (5-16)

A brief survey is given of aluminium and tantalum electrolytic capacitors. The fundamental behaviour of the dielectrics are discussed particularly with reference to the temperature coefficient of capacitance. It is shown, however, that the fundamental properties are masked by the presence of electrolyte, used to heal the dielectric film during use and to connect to the dielectric when it is deposited in the etched channels that can be formed in both aluminium and tantalum foils. The practical preparation of both etched aluminium and tantalum foil and also sintered tantalum capacitors are discussed. Scanning electron micrographs are used to illustrate the structures obtained.

3077. Theory and experiments for teaching measurement. Part 7 - Korn J. and Simpson K. - Fac. Technol., Enfield Coll., Middlesex - INSTRUM.PRAC. 1971 25/4 (205-209)

In this experiment two methods of detecting angular velocity of the rotating shaft of an electric motor, are examined and how the signal is converted and then presented to provide a visual indication will be demonstrated. The two methods make use of the characteristics of magnetic, proximity pickups and tachogenerators.

3078. New technologies lead to highly advanced semiconductor components - Mitchell B. - ELECTR.ENGINEERING 1971 43/519 (36-39)

Intensive research into new materials technology and processes for discrete semiconductor components (see references) has led to a number of new and highly advanced devices, together with considerable improvements in the performances of many existing device types. The most significant developments have taken place in optoelectronic and microwave components, with the result that devices such as 72 x 5 photodiode arrays, all solid state t.v. cameras, GaAs microwave diodes with very high figures of merit, power transistors operating at C band frequencies, and inexpensive microwave i.c. Doppler radar units are now available commercially.

3079. Sterilization problems of synthetic biocompatible materials - Bruck S.D. - Med. Devides Applicat. Program, Nat. Heart Lung Inst., NIH, Bethesda, Md. 20014 - J.BIOMED.MAT.RES. 1971 5/3 (139-158)

The past, present, and future of biocompatible materials are reviewed as they relate to cardiovascular prostheses. Many of these materials are no longer simple systems and do not lend themselves to conventional steam or heat sterilisation procedures by virtue of their lability. The object of this paper is to briefly discuss sterilization problems encountered with these labile materials using ionization radiation and gases, in terms of their physico chemical structure.

3080. In vitro investigation of the adhesive strength of cyanoacrylate bonds to human hard tooth structures - Khowassah M.A. - Univ. Iowa, Coll. Dent., Iowa City, Ia. - J.BIOMED.MAT.RES. 1971 5/3 (159-168)

Three different cyanoacrylate monomers were studied as adhesives for hard tooth structures. Flat plane non retentive surfaces of extracted human teeth and cold curing acrylic onlays were used as the adherends. Both tensile and shear adhesive strengths were investigated under wet and dry conditions at room temperature. The commonly used zinc phosphate dental cement was the control material. Under all test conditions the cyanoacrylates were shown to have greater adhesive strength than the dental cement. The MBR 4197 (β,β,β trifluoroisopropyl 2 cyanoacrylate) polymer showed the greatest bonding strength to hard tooth structures. The adhesive strengths of all cyanoacrylate polymers decreased considerably after water immersion but the control dental cement material showed no adhesive strength under the same condition. However, the results of the experimental monomers when compared to the control cement, should encourage further investigations of these monomers for use as dental adhesives.

3081. The amount of tin in the γ_1 phase of dental amalgam - Johnson Jr L.B. - Dept. Materials Sci., Sch. Engin. Applied Sci., Univ. Virginia, Charlottesville, Va. - J.BIOMED.MAT.RES. 1971 5/3 (239-244)

Spherical particle Ag Sn alloy powders containing 4.3, 8.3, 12.0, 15.4, 18.5, 21.4, and 24.1 atomic per cent Sn were obtained. Amalgams from these alloys were examined by X ray diffraction and metallography for the presence of the γ_2 phase and the γ_1 β_1 phase transformation. A single amalgam of the approximate composition of dental amalgam was prepared from a melt at high temperature and pressure and likewise examined. Results showed that the solubility of Sn in Ag Hg is about 7 atoms of Sn per unit cell of the γ phase. As clinically prepared, the γ_1 phase of dental amalgam contains, however, only about 5 atoms of Sn per unit cell. These 5 atoms, nevertheless, result in a very considerable stabilization of this phase due to the increase in its electron concentration.

3082. The need for radiopaque denture base materials: A review of the literature - Chandler H.H., Bowen R.L. and Paffenbarger G.C. - Amer. Dent. Ass., Res. Div., Nat. Bur. Stds, Washington, D.C. 20234 - J.BIOMED.MAT.RES. 1971 5/3 (245-252)

The need for esthetic and functionally acceptable radiopaque denture base materials is reflected by numerous reports of patients who ingested or aspirated portions of dentures and reports of difficulties encountered in the removal of these dentures because they could not be located radiographically. The type of denture most commonly ingested or aspirated is a maxillary partial consisting of a palatal piece to which is attached one or more anterior teeth. It may or may not have clasps. Ingestion or aspiration of the foreign body commonly occurs when either broken or ill fitting dentures are being worn. Few cases have been reported where patients swallowed portions of complete dentures. Previous attempts at providing radiopacity have included addition of heavy metal salts or radiopaque inserts to denture base resins. None of these attempts has been entirely successful. Elimination of dentures as foreign bodies requires a greater effort toward preventive measures by the dentist and the patient. When dentures are swallowed or inhaled, the dentist should immediately seek medical assistance for the patient. The common symptomless period following ingestion or aspiration should not lead the dentist to believe that there will not be serious subsequent complications.

3083. Development of a radiopaque denture base material - Chandler H.H., Bowen R.L. and Paffenbarger G.C. - Amer. Dent. Ass. Res., Div. Nat. Bur. Stds, Washington, D.C. 20234 - J.BIOMED.MAT.RES. 1971 5/3 (253-265)

Radiopaque glass resin composites were made for evaluation as denture base materials. The addition of silane treated, radiopaque, powdered glass to clear poly (methyl methacrylate) resulted in composites that had greater optical translucency than commercially available pink denture base resins. These formulations could be pigmented and opacified to produce materials that simulated oral soft tissues in color and translucency. Other compositions were made using various monomer, polymer and glass combinations. Those made from mixes of BIS GMA, methyl methacrylate, poly (methyl methacrylate), and radiopaque glass had excellent translucency but handling characteristics were less than ideal. Removal of very small glass particles (less than a few μm) appeared to improve optical translucency. A radiographic survey of 12 specimens that contained from 29 to 57% of the radiopaque glass, indicated that all had sufficient radiopacity to aid in localization of swallowed or aspirated dentures made from such materials. Finishing procedures on composite specimens were more difficult and time consuming and did not produce surfaces as smooth as those obtained on poly (methyl methacrylate). The finished surfaces felt smooth to the tongue but might stain more easily in the mouth.

3084. Fatigue behavior of type 316 stainless steel under simulated body conditions - Wheeler K.R. and James L.A. - Pacific Nthwest Lab., Battelle Mem. Inst., Richland, Wash. 99352 - J.BIOMED.MAT.RES. 1971 5/3 (267-281)

The fatigue crack propagation behavior of Type 316 stainless steel was studied under simulated body conditions. The fatigue specimens were immersed in circulating Ringers Solution at a temperature of 98° F. Cyclic loading was accomplished at a frequency and load waveform that corresponded to normal level walking. The concepts of linear elastic fracture mechanics were used to evaluate the fatigue behavior, and it was found that the crack growth rate was higher under simulated body conditions than for a corresponding test conducted under ambient air conditions.

2. BIOPHYSICS AND BIOENGINEERING

3085. Neural membrane structure and function: a proposed molecular mechanism - Cook A.M. - Univ. Wyoming, Laramie, Wyo. - IEEE TRANS.BIO-MED.ENG. 1971 BME-18/1 (76-77)

This thesis proposes a mechanism to account for the permeability changes that occur in the excitable membrane during the generation and propagation of an action potential. This mechanism postulates that excitation and conduction occur via propagated physicochemical transformations of the axonal membrane structure. The mechanism is strongly supported by existing evidence from electrophysiology, molecular biology, biophysics, biochemistry and cellular biology. Further evidence for judging the validity of this model can be obtained from possible experimental and theoretical studies. There are also other implications to be derived from the model. For example, many receptor cells have been shown to be free nerve endings. Applications of this membrane model may provide further understanding of these transducer cells. In addition, the determination of a functional mechanism for single cell phenomena may also lead to an elucidation of similar mechanisms for multicellular systems.

2.1. Fundamental concepts

3086. Biasing of f.e.ts ensures consistent circuit performances - Sherwin J. - ELECTR.ENGINEERING 1971 43/518 (52-56)

F.E.T. amplifiers can be unnecessarily sensitive to device characteristics if the proper biasing methods are not employed. One way to obtain consistent circuit performance in spite of wide device variations is to use a combination of constant voltage and self biasing. The combined circuit configuration turns out to be the same as that generally used with bipolar transistors, but its operation and design are quite different.

3087. Evolution towards steady state in membrane transport problems - Seshadri M.S. - Cent. Theoret. Biol., State Univ. New York, Buffalo, Amherst, N.Y. 14226 - J.THEOR.BIOL. 1971 31/2 (245-253)

A generating function method is used to describe the approach to steady state in time dependent membrane transport problems. Specifically, it is applied to one of a variety of lattice like membrane models developed by Hill and Kedem. The evolution towards the (asymptotic) steady state is discussed.

3088. A comparison of numerical methods for solving optimal control problems - Spingarn K. - Hughes Aircraft Co., Culver City, Calif. 90230 - IEEE TRANS.AEROSPACE ELECTR.SYSTEMS 1971 AES-7/1 (73-78)

Linear systems with quadratic performance criteria typically lead to 2 point boundary value problems. The numerical solution of such problems is often difficult because of roundoff and truncation errors. In this paper numerical methods for digital computer solutions are considered for a system described by a given second order linear differential equation and the results are compared. The results show that where accurate analytic solutions cannot be obtained, the invariant imbedding technique yields more accurate results, for a given integration grid interval, than the other methods considered.

3089. Modelling biological systems - Janes F.R. and Carson E.R. - Dept. Syst. Automation, City Univ., London - ELECTRONICS POWER 1971 17/3 (110-116)

Cooperation between control engineers and biologists can help in the understanding of both biological and control systems. The human body's own control systems can be successfully modelled using the techniques of control engineering.

2.2. Mechanical systems

3090. The role of Ca ions in the excitation contraction coupling mechanism (Japanese) - Takahashi Y. - Dept. Physiol., Jikei Univ. Sch. Med., Tokyo - TOKYO JIKEIKAI MED.J. 1970 85/2 (146-162)

The role of Ca of muscle fibres in the excitation contraction coupling was examined and it was concluded that when the localization of intracellular Ca ions inside vesicles and Ca ions bound to the surface of the vesicles, is taken into consideration, free Ca ions are the trigger of contraction, and that when the concentration of free Ca ions decreases, bound Ca ions are released as free Ca ions.

3091. Laboratory for kinesiologic analysis - Wirta R.W., Taylor Jr D.R. and Ray Finley F. - Krusen Cent. Res., Temple Univ. Moss Rehab. Hosp., Philadelphia, Pa. 19122 - BULL.PROSTHET.RES. 1970 Ser.10/13 (165-172)

Special equipment and instrumentation have been developed to obtain ground reaction forces and body position measurements in the analysis of pathologic gait. The equipment allows the acquisition of maximum information during a minimum number of test trials so as not to impose undue physical demands upon the patient under study. Special features of the equipment permit automatic data recording and reduction to eliminate the arduous manual process employed heretofore. By rendering the data automatically onto punched cards, modern electronic data processing means may be used to develop descriptions of the gait and to calculate the kinematics and kinetics of locomotion. Information gained from the above measures is of inestimable value in many ways. In bioengineering design the information is critical to the development of bracing and artificial limb configurational concepts specifically related to such factors as points of application of force, the areas of stress and strain, the areas and location of pressures transmitted to body tissues, the requirements for permitting or restricting motion and the strength requirements of materials used. Where mechanical or electrophysiological bracing is under consideration the information is useful to determine the feasibility of applications in their conceptual stage, thereby precluding costly procedures involving trial and error fabrication and testing. The use of the measures is important in evaluating orthopedic treatment procedures in functional training for daily living activities, and in the evaluation of components and appliances used by patients. The information contributed relative to forces acting about the leg joints in the frontal and transverse planes permits new dimensions to biomechanics analysis.

3092. Flexural properties of equine metacarpus - Bynum Jr D., Ledbetter W.B., Boyd C.L. and Ray D.R. - A and M Univ., College Station, Tex. - J.BIOMED.MAT.RES. 1971 5/1 (63-79)

The flexural tests on 37 whole equine metacarpus bones are described and the results are given in terms of fundamental material properties as a function of age. The moduli of elasticity, rupture, and failure increase then decrease with increasing age. The rupture and failure deformations decrease with age. The stiffness and fragility indices increase with age. Averaging the data for all ages, the modulus of rupture was 35 ksi, the deflection at rupture was 0.22 inches, and the modulus of elasticity was 1.7 x 10 psi. The flexural rupture strength is about twice the uniaxial compression strength and about five times greater than the torsional strength for whole bone tests. The moduli of elasticity are about the same for flexure and uniaxial compression, and about five times greater than the torsional modulus of rigidity for whole equine bone.

3093. Supportive forces on the human body during underwater activities - Seireg A., Baz A. and Patel D. - Dept. Mech. Engin., Univ. Wisconsin, Madison, Wis. 53705 - J.BIOMECH. 1971 4/1 (23-30)

This study deals with the evaluation of the magnitude of the supportive forces and moments resulting from human activities in an underwater environment. A platform capable of monitoring all components of supporting forces and moments has been used in a water tank. Results from similar activities in air and water are presented. A mathematical model has been developed to verify the experimental results. The model can be utilized for the analysis of human body dynamics underwater.

3094. The helix as propeller of microorganisms - Schreiner K.E. - Dept. Mathemat., Univ. Oslo - J.BIOMECH. 1971 4/1 (73-83)

A phenomenological approach is employed in determining the forces and moments on a rotating helix by the resistance of the surrounding liquid at low Reynolds numbers, and it is shown how they may be balanced by the forces and moments on a spherical head. Within the restrictions of the analysis it is found that if the head rotates it can only have one helical propeller. But if the number of flagella is 4n, half of them rotating in each direction, the head will not rotate. The rate of energy transmission to the surrounding liquid is evaluated in each case; it is found to be lower in the latter case, and in the former case it increases with the square of the ratio between helix and head radii. The efficiency of the propulsion system is found to be practically independent of the viscosity of the surrounding liquid.

3095. The biomechanics of torsional fractures: the effect of loading on ultimate properties - James Sammarco G., Burstein A.H., Davis W.L. and Frankel V.H. - Div. Orthop. Surg., Case Western Res. Univ., Cleveland, Ohio 44106 - J.BIOMECH. 1971 4/2 (113-117)

Mechanical properties of bone tissue have been studied to determine the viscoelastic behavioral characteristics. Whole bones, however, have not been examined to determine the effect of loading rate on ultimate properties. This paper presents results obtained from torsional tests of fresh dog tibiae and femora tested at both high and low loading rates. The data which is presented includes energy absorption required for failure, maximum torque, and maximum angular deformation before failure. A comparison of these properties is made between paired specimens tested at high rates of loading and at low rates of loading. The findings indicate increased energy absorption, increased maximum torque, and slightly increased angular deformation under rapid loads. In addition there is a strong suggestion of a different fracture pattern.

3096. Driving point impedance characteristics of the head - Stalnaker R.L., Fogle J.L. and McElhaney J.H. - West Virginia Univ., Morgantown, W.V. 26505 - J.BIOMECH. 1971 4/2 (127-139)

The mechanical impedance of the human and monkey (Macaca mulatta) head was determined over the frquency range 30-5000 Hz. Miniature accelerometers and pressure transducers were placed in the brain to measure its response to vibration at constant g levels and variable frequency. The maximum acceleration studied was 20 g's. In vitro experiments on a fresh human cadaver and in vivo and in vitro experiments on monkeys were performed. The effect of varying blood pressure was investigated as well as the contribution to the mechanical impedance of the scalp, skull and brain. A linear two degree of freedom model that summarizes the results with acceptable accuracy is presented. Certain non linear responses were observed for various input accelerations. No significant effect on impedance due to time after death was found for times up to five hours. The implantable accelerometer and pressure transducer experiments indicated that the brain is very nearly critically damped. Raising the blood pressure was shown to stiffen the brain, causing the resonance frequency of the head to increase.

3097. A standard test for laboratory animal bone - Burstein A.H. and Frankel V.H. - Case Western Res. Univ., Cleveland, Ohio 44106 - J.BIOMECH. 1971 4/2 (155-158)

The purpose of this paper is to describe the technique and instrumentation for a proposed standard method of mechanical testing of long bones.

2.3. Heat and thermodynamics

3098. Entropy reduction in open systems - Forrest R.F. - Dept. Phys., Univ. California, Berkeley, Calif. 94720 - J.THEOR.BIOL. 1971 31/1 (43-46)

An example of ordering in an open system is presented within the context of a generalized version of the Onsager and Machlup theory of irreversible thermodynamics. The significance of this example for an understanding of biological ordering processes is discussed.

2.4. Bioacoustics

3099. Effects of transmission delay on conversational behavior on echo free telephone circuits - Brady P.T. - BELL SYST.TECHN.J. 1971 50/1 (115-134)

The present study sought to determine the effects of echo free transmission delays of 600 ms and 1200 ms on conversational behavior when subjects were unaware that delay was present. Sixteen pairs of male subjects conversed 10 min. each over an echofree telephone circuit with zero delay and 10 min each with 600 ms round trip delay; a second group of 16 pairs conversed 10 min each on zero delay and 1200 ms round trip delay. Subjects noticed nothing unusual about the circuit, but the delay caused a statistically significant increase in frequency of confusions and in amount of both double talking (simultaneous speech from both speakers) and mutual silence. Analysis by means of an on off pattern generating model revealed that subjects seem to make some adjustments in their speaking behavior; they tend to wait longer for responses and keep talking longer when interrupted. The 7 delay values of 600 ms and 1200 ms produced virtually identical effects in the measures made here. All of the subjects in the study were inexperienced with delay circuits; this experiment does not address itself to the possibility that experienced subjects might react differently to the delay. Further work will investigate the effects of training subjects to notice delay.

3100. A scheme for speech processing in automatic speaker verification - Das S.K. and Mohn W.S. - IBM Corp., Res. Triangle Park, N.C. 27709 - IEEE TRANS.AUDIO ELECTROACOUSTICS 1971 AU-19/1 (32-43)

Experiments investigating adaptive pattern recognition in automatic speaker verification are reported. A binary decision confirming or rejecting a speaker's purported identity is required. The experiments involve 7000 phrase length utterances of 118 speakers. An average misclassification rate of 1% with a 'no decision' rate of 10% is obtained. Other experiments indicate that the utterances used for training purposes should preferably be collected over a relatively long period of time.

3101. Computer generated spectrogram displays for on line speech research - Mermelstein P. - Bell Telephone Laboratories, Inc., Murray Hill, N.J. 07974 - IEEE TRANS.AUDIO ELECTROACOUSTICS 1971 AU-19/1 (44-47)

A program to generate and display spectrograms on a computer controlled scanned display television monitor is described. The program features computation of power spectra for selected time segments with the aid of the fast Fourier transform algorithm, four level intensity quantization controlled by a threshold under operator control, and flicker free scanned display of the generated data. The computer generated spectrograms suffer from intensity and spatial resolution limitations relative to conventional spectrograms. However, their rapid generation and flicker free display makes their use appropriate in a man computer interactive environment to complement aural evaluation of digitally synthesized or processed speech signals.

3102. Suggested principle of cochlear organization: The addressed exponential delay line - Nieder P.C. - Presbyt. Univ. Pennsylvania Med. Cent., Philadelphia, Pa. 19104 - J.THEOR.BIOL. 1971 31/2 (371-374)

A principle of organization for the cochlear receptor is suggested, which could account for its great power of frequency analysis and also provide a basis of explanation for a number of its singular physiological properties. This model has three central concepts. First, that the time of travel of mechanical wave motion down the basilar membrane produces what is approximately an exponential delay line for the acoustic input - with extinction of waves as they shorten beyond some minimal length constant. Second, that there is an interaction between afferent nerve fibers emerging from the modiolus and going to or passing near a given inner hair cell: the interaction being that integrated activity of these fibers innervating outer hair cells acts to gate the firing of fibers innervating the given inner hair cell. Third, that the fibers associated with each inner hair cell, but passing out to innervate the outer hair cells, are distributed to the outer hair cells in a definite pattern which essentially addresses them to the precise traveling wave pattern produced by a very narrow band of frequencies.

2.5. Biooptics

3103. Dispersion curve of responses evoked by visual stimuli. Method for analysis of stochastic mechanisms involved in information processing in the brain - Crighel E. and Constantinescu V. - Inst. Neurol., Bucharest - INT.J.BIOMED.COMPUT. 1971 2/1 (49-69)

Physiological data as well as informational arguments pointed to the importance of the noncomformity of individual responses to the averaged response evoked by flashing lights. The authors studied the dispersion curve ($D=f(t)$) compared with the averaged response in humans and experimentally in cats, in normal as well as in pathological conditions. In normal cases a special pattern of the dispersion curve in humans was observed, marked by a first period with high amplitude of dispersion, a second period with very small dispersion, and a third period likewise with high amplitude. In normal cats the same pattern of the dispersion curve was observed, but with other latencies of the three periods. In pathological conditions the amplitude and pattern of the dispersion curve were modified. Correlation with pathological and physiological conditions renders it possible to assume that the different periods of the dispersion curve represent the predominance of stochastic or deterministic mechanisms involved in the cortical reactivity to peripheral stimulation.

2.6. Gas physics

3104. Dynamics of gas bubbles in whole blood and plasma - Yang W.J. - Dept. Mechan. Engin., Univ. Michigan, Ann Arbor, Mich. 48104 - J.BIOMECH. 1971 4/2 (119-125)

Analytical solutions are obtained for both the radius time relation and the rate of solution by diffusion of a gas bubble in plasma and whole blood with reduced hemoglobin. If an oxygen bubble is situated in the blood, a concentration boundary is formed in which the combined processes of diffusion and chemical reaction takes place. The effect of surface tension on the bubble dynamics is also considered. Applications of the analytical results include the extracorporeal oxygenation of the blood and the determination of the diffusion coefficient in plasma and the reaction velocity constant in whole blood.

2.7. Fluid flow systems

3105. A physical basis for two phase pressure gradient and critical flow calculations - Tremblay P.E. and Andrews D.G. - Univ. Toronto - NUCL.SCI.ENGNG 1971 44/1 (1-11)

From the basic conservation equations in two phase hydrodynamics, an expression for the pressure gradient has been derived. A key quantity in the denominator of that expression is recognized as the ratio of the actual to sonic two phase mass fluxes. This dimensionless ratio is seen as a generalisation of the Mach number. The expression for the sonic mass flux is shown to be an equation of state depending only on local properties of the fluid. The conditions that make the dimensionless ration equal to 1 are shown to correspond to the critical conditions.

3106. Theoretical analysis of a left ventricular pumping model based on the systolic time varying pressure/volume ratio - Hiroyuki Suga - Inst. Med. Electron., Fac. Med., Univ. Tokyo, Tokyo - IEEE TRANS.BIO-MED.ENGIN. 1971 BME-18/1 (47-55)

A left ventricular pumping model based on a left ventricular systolic time varying pressure/volume ratio e(t) has been proposed on the basis of the physiological studies indicating that the parameter e(t) is a function of time in systole, almost independent from left ventricular volume and the arterial loading conditions, and is a good index of myocardial inotropism. The model has been formulated. Quantitative relationships among various hemodynamic parameters are obtained, and these appear to be in good agreement with the physiological characteristics of the left ventricle.

3107. An automated data acquisition and analysis system for a cardiac catheterization laboratory - Mesel E. and Gelfand M. - Dept. Ped., Stanford Univ. Sch. Med., Palo Alto, Calif. 94305 - COMPUT.BIOL.MED. 1971 1/3 (199-213)

A photokymographic and analog magnetic type recording system was modified to facilitate automatic data acquisition during cardiac catheterization for subsequent automatic analysis by a digital computer. Independence from computer failure and economical use of computer services were thus achieved. Information gathering was automated by replacing manually operated with electrically driven valves, and by using an electromechanical programming switch to provide strict temporal formatting. Hardware and programming features for automatic analysis are described in detail.

3108. Sensitivity of electromagnetic velocity probes - Bevir M.K. - Nuffield Inst. Med. Res., Univ. Oxford - PHYS.MED.BIOL. 1971 16/2 (229-232)

The weight function distribution is given for an electromagnetic velocity probe. The sensitivity to flow falls off inversely as the 4th power of distance from the probe. Such instruments cannot measure flow but can measure the velocity of a uniformly moving stream. The sensitivity is dependent on the boundary layer thickness, but this dependence can be reduced by making the transverse magnetic field small near the probe wall.

3109. Study on the low Reynolds number flow in a valved vessel - Lew H.S. and Fung Y.C. - Dept. Physiol., Univ. Arizona, Tucson, Ariz. 85721 - J.BIOMECH. 1971 4/2 (85-94)

The understanding of the fluid flow in valved vessels is of importance pertaining to its application to the problem of fluid transport in valved vessels of the living body, such as veins and lymphatic ducts. In order to have a quantitative understanding of fluid flow through valved vessels, the Newtonian fluid flow through a rigid circular cylindrical tube involving a series of uniformly spaced plate orifices of axisymmetric geometry is studied at low Reynolds number. The solution of the above problem is posed as a series solution of the Stokes equation and the equation of continuity, satisfying the appropriate boundary conditions. The velocity distributions and the average rate of the mean pressure change along the tube axis are computed for a number of different combinations of the orifice tube radius ratio and the ratio of the inter orifice distance to the tube radius. The results of the analysis are discussed for possible application to certain physiological systems.

3110. Theoretical analysis of flow patterns in single file capillaries - Huang H.K. - Nat. Biomed. Res. Found., Silver Spring, Md. 20901 - J.BIOMECH. 1971 4/2 (103-112)

A mathematical model is proposed to simulate the flow pattern in a single file capillary. In the case of no red blood cells inside the capillary, the biharmonic equation is assumed to dominate the flow pattern of the plasma. Additional boundary conditions are derived when different numbers of red blood cells are included in the capillary. A finite difference method is used to solve the boundary value problem.

Various numerical results correlating the stream function and the distribution and relative velocity of red cells are obtained which are compatible with the earlier experimental data.

3111. The shift of the arterial pulse wave foot on recordings with a rising or falling baseline - Weinman J. and Sapoznikov D. - Rogoff Lab. Med. Electron., Hadassah Med. Sch., Hebrew Univ., Jerusalem - IEEE TRANS.BIO-MED.ENGIN. 1971 BME-18/1 (56-59)

Recordings of arterial pulse waves often appear on a rising or falling baseline. This causes a shift in the position of the pulse wave foot as compared to its position on the horizontal baseline. The magnitude of this shift is unknown. Workers therefore tend to disregard pulse wave recordings with sloping baselines when measuring foot to foot pulse wave velocities. A formula was derived that allows an estimation of the upper limit of the shift in the position of the pulse wave foot to be $tm = 1000n/157$ ms, where $n = b/A$, b is the slope of the baseline, and A is one half the arterial pulse wave amplitude. In the majority of recordings with sloping baselines, $n < 0.5$ and tm does therefore not exceed 3 ms. Compared to the measured foot to foot time intervals, tm is usually small enough to be disregarded. In cases where n is larger, the formula can be used to estimate the upper limit of the error caused by the sloping base line.

3112. Mathematical simulation of normal nephron function in rat and man - Koushanpour E., Tarica R.R. and Stevens W.F. - Dept. Physiol., Northwest. Univ. Med. Sch., Chicago, Ill. 60611 - J.THEOR.BIOL. 1971 31/2 (177-214)

A mathematical model of the nephron was developed by writing a set of material balance equations for the flow of water, sodium and urea along the length of the nephron. The differential equations derived incorporated the geometrics of an average nephron. The parameters of these equations were calculated using the analytical solutions and the available micropuncture data. The model yielded piecewise continuous curves for volume flow rate and sodium and urea concentration profiles emphasizing the sequential processing of the filtrate along the consecutive nephron segments. The simulation of normal function in the rat nephron agreed reasonably well with the tubular fluid to plasma ratio data for inulin, urea and sodium along the proximal and distal tubules. Assuming a linear medullary interstitial solute concentration profile, the model generated continuous curves for the luminal concentrations of sodium and urea along the descending and ascending limbs of the loop of Henle. The simulated curves were consistent with available micropuncture data for sodium and suggested a possible mechanism for the handling of urea by the nephron to account for the passive recirculation of this solute and its role in the development of the longitudinal medullary concentration gradient. The simulation of the human nephron, after making certain necessary extrapolations from the rat nephron, gave comparable curves for water, sodium and urea transport.

2.8. Electrical systems

3113. Fast switching between voltage and current control of membrane clamps - Gebhardt U. and Lindemann B. - II Dept. Physiol., Univ. Homburg - MED.BIOL.ENGINEERING 1970 8/3 (315-317)

A voltage clamp can be converted into a current clamp by simply feeding a voltage proportional to the membrane current to the control amplifier instead of one proportional to membrane voltage. It was realised that such a conversion, when done with sufficient speed during an experiment, might yield interesting data which cannot otherwise be obtained. However, the relays which have been employed for this purpose in the past (Giebish and Weidman, 1967) are too slow to be used for the study of fast membrane phenomena. The problem can be solved rather satisfactorily with solid state switches. Details of a suitable circuit are given.

3114. Inter and intraindividual variation in EOG - INTER UND INTRAINDIVIDUELLE STREUUNG IM EOG - Muller W. and Haase E. - Augenklin., Med. Akad., Erfurt - A.V.GRAEFES ARCH.KLIN.EXP.OPHTH. 1970 181/1 (71-78)

A total of 140 electrooculograms were recorded on 3 healthy persons. It could be shown that the inter and intraindividual variation was very substantial. The results could be statisticomathematically established. The method has important implications for clinical investigations.

3115. Two approximations to the median evoked response - Walter D.O. - Space Biol. Lab., Brain Res. Inst., UCLA, Los Angeles, Calif. 90024 - ELECTROENCEPH.CLIN.NEUROPHYSIOL. 1971 30/3 (246-247)

A method of approximating median evoked responses, without requiring large storage or computation facilities, is suggested and illustrated.

3116. Stochastic dependency of neural impulse sequences - Nakahama H., Ishii N., Yamamoto M. and Saito H. - Div. Neurophysiol., Inst. Brain Dis., Tohoku Univ. Sch. Med., Sendai - TOHOKU J.EXP.MED. 1971 103/1 (117-118)

The statistical dependent properties of the spontaneous impulse sequence recorded from the mesencephalic reticular formation (MRF) and the lateral geniculate nucleus (LGN) in cats were clarified with the following procedures: the value of each interspike interval was normalized by the mean value of the intervals, and the stochastic dependency of the normalized sequence was calculated. It is suggested that Markov property exists in the spontaneous impulse sequences recorded from MRF single neurons and not from LGN single neurons.

3117. An application of electrocardiographic lead theory to impedance plethysmography - Geselowitz D.B. - Dept. Biomed. Engin., Moore Sch. Electrical Engin., Philadelphia, Pa. - IEEE TRANS.BIO-MED.ENGIN. 1971 BME-18/1 (38-41)

3118. Analog simulation of A-V conduction block and Wenckebach phenomenon - Licko V. and Landahl H.D. - Dept. Biochem. Biophys., Univ. California, San Francisco, Calif. 94122 - COMPUT.BIOL.MED. 1971 1/3 (185-192)

The study of a mathematical model of A-V conduction block and Wenckebach phenomenon, based on a 2-factor excitation and conduction therapy, is aided by analog simulation. P and R wave generators and 2 generators of internal functions of the model with a comparator constituted the main 5 components of the electronic analog. The role of several parameters of the model may be shown. Variation of a single parameter can account for the progressively increasing P-R intervals which follow a skipped beat as well as the rarity of Wenckebach ratios above 8:7. It suggests an approach to differential diagnosis of reduced sensitivity from reduced recovery.

3119. Computation of solutions to the inverse problem of electrocardiography - Schloss H.S. - 215 N. Rexford Drive, Beverly Hills, Calif. 90210 - COMPUT.BIOL.MED. 1971 1/3 (193-198)

Despite over 30 yr of widespread research, there does not exist today a valid method of mathematically transforming ECG, VCG, etc. data into a form that provides approximate diagnoses such as 'left ventricular infarct of moderate size'. This paper reviews the major efforts on this problem including a recent stochastic identification approach suggested and tested by the author, and outlines and assesses difficulties inherent in these techniques. In the development of some approaches such as Fourier analysis of ECG's it appears that at best one can only succeed in transforming the difficult problem of relating ECG's to physiological condition of the myocardium into the more difficult and possibly unsolvable problem of relating Fourier coefficients derived from ECG's to the physiological conditions. The advantages of using constrained dipole models were recently described. The author feels that the most promising current technique under study is a modified version of the above mentioned stochastic identification approach which employs dipole models in which the parameters have a range of several discrete values. A computer program that employs this approach will be described in detail.

3120. Fiber interaction in a nerve trunk - Clark Jr J.W. and Plonsey R. - Bioengin. Group, Electr. Engin. Dept., Rice Univ., Houston, Tex. 77001 - BIOPHYS.J. 1971 11/3 (281-294)

This paper is concerned with the nature of the transmembrane potential induced in an inactive nerve fiber lying in an impressed potential field within a nerve trunk. The impressed potential field is assumed to be produced by the synchronous activity of other fibers within the trunk; an expression for the induced transmembrane potential is obtained utilizing the principles of electromagnetic field theory. The results strongly indicate that membrane capacitance is the main determinant of the induced transmembrane potential wave form.

3121. Influence of the latency fluctuations and the quantal process of transmitter release on the end plate potentials' amplitude distribution - Soucek B. - Brookhaven Nat. Lab., Upton, N.Y. 11973 - BIOPHYS.J. 1971 11/2 (127-139)

Spontaneous synaptic potentials and their relation to the end plate potential (e.p.p.) are studied. It has been suggested earlier that the e.p.p. at a single nerve muscle junction is built up statistically of small all or none units which are identical in size with the spontaneous miniature end plate potentials (m.e.p.p.'s). In this paper, a more general theory is developed which takes into account latency fluctuations of the unit components. A general equation for e.p.p. amplitude probability distribution is derived. This probability distribution is a function of the latency distribution, m.e.p.p.'s pulse shape, m.e.p.p.'s amplitude distribution, and the mean quantal content. The time course of transmitter release, or latency distribution, is derived from a histogram of synaptic delays in a frog muscle, but obtained equations can be used for other distribution functions as well.

2.9. Nuclear biophysics

3122. Interaction of low intensity ultrasound and ionizing radiation with the tumour cell surface - Repacholi M.H., Woodcock J.P., Newman D.L. and Taylor K.J.W. - Phys. Dept., Guy's Hosp. Med. Sch., London - PHYS.MED.BIOL. 1971 16/2 (221-227)

The effects of low intensity ultrasound and X irradiation on the surface charge of tumor cells are described. Cell electrophoresis was used to detect any change in mobility of Ehrlich ascites tumor cells exposed to both single and combined treatments of ultrasound and X rays. Irradiation with ultrasound at 1 MHz frequency, with a peak intensity of 10 w cm^{-2}, pulsed 1 : 10 for 5 min, gave 15% reduction in mobility; 1000 rads of 220 kV X rays gave the same reduction, while combined treatments gave 30%.

3. GENERAL INSTRUMENTATION

3123. Isolation transformer - friend or foe? - Doyle O. - ELECTRONICS 1971 44/3 (73-74)

A battle is raging over the use of isolation transformers in hospitals. One side holds that the devices, which isolate hospital power lines from ground, are essential to protect patients against potentially lethal shock hazards in medical electronics gear. The other side claims that the transformers not only are too expensive but also create hazards themselves. A detector called a line isolation monitor, which measures the leakage current from the isolated lines to ground is proposed as a better solution.

3124. Gate suppresses pulses from switch contact bounces - Fontaine G. - Coll. de France, Paris -

ELECTRONICS 1971 44/6 (76)

A gating circuit with an intrinsic dead time of 20 milliseconds will prevent switches from generating more than one logic pulse regardless of contact bounce. Most mechanical switches bounce anywhere from 5 microseconds to 5 milliseconds after the first closure. Either circuit sets the pulse and bounce suppression times via two resistors and a small capacitor. One circuit gives a positive going output pulse and the other a negative going pulse.

3.1. Transducers

3125. Feedback amplifier speeds phototransistor's response - McCartney M.L. - Univ. Virginia, Charlottesville, Va. - ELECTRONICS 1971 44/6 (77)

When difficulty is encountered in detecting low level ac or pulsed light signals, the problem is usually not a lack of sensitivity in the phototransistor. It is more likely a loss of bandwidth in conventional photocurrent to voltage converters. One solution is to use a high gain operational amplifier to self bias the phototransistor and thereby improve its response time. The transistor helps the op amp make the conversion by contributing to feedback; the op amp supplies current to keep the transistor at a more optimum operating point. The circuit amplifies very low level modulated light signals. The amplifier, compensated for a gain of 1,000, is saturated by a light level of 100 nanowatts from a 900 nanometer source. Output rise time is well under 1 microsecond at this level.

3126. Use of solid state acoustic transducers in communications - Mason W.P. - Henry Krumb Sch. Mines, Columbia Univ., New York, N.Y. 10027 - IEEE TRANS.AUDIO ELECTROACOUSTICS 1971 AU-19/1 (13-18)

Semiconductor and solid state devices were used extensively to measure and generate stresses and stress waves in solids, liquids, and gases. Semiconductor devices were used as strain gauges to measure strains and to respond to acoustic pressures. p-type silicon has a gauge factor of over 100 times that of a metallic strain gauge. By using the amplifying regimes of Esaki diodes and transistors, a great increase in sensitivity is obtained and microphones were constructed that are more sensitive than the carbon microphone. With the advent of monolithic transistor on single chips and films, it appears likely that the most stable and economical devices are obtained by separating the pickup and amplifying functions. p-n junctions have a region (the depletion region) where electrons are excluded and if the semiconductor is piezoelectric, very high frequency transducers for generating mechanical waves in solids can be produced. Evaporation techniques can also be used to produce frequencies from lower ranges to very high frequency ranges. With the advent of more highly coupled piezoelectric crystals and ceramics, this technique may be extended further. Solid state transducers were constructed using the Hall effect and the magnetoresistance effect. These were applied in measuring static and dynamic fluxes, as variable resistors without sliding contacts and as displacement meters and microphones.

3127. A voltage controlled force generator for calibrating sensitive transducers - Minns H.G. - Dept. Physiol., Biophys., West Virginia Univ. Med. Cent., Morgantown, W.Va 26506 - J.APPL.PHYSIOL. 1971 30/6 (895-896)

An inexpensive d'Arsonval panel meter was modified for use as a voltage controlled force generator for calibrating sensitive (0-100 mg) force transducers. The instrument is more convenient for calibration purposes than known weights since the output force is continuously variable and acts in any direction. A 10 turn dial controls the magnitude of the force from 0.0 to 100.0 mg with a maximum error of ±0.1 mg. An external voltage can be used to generate staircases, triangles, and other time varying force waveforms. An operational amplifier in a current pump configuration supplies a precisely controlled current to the meter coil. Construction details are given at the end of the paper.

3.2. Amplifiers

3128. A stable, inexpensive, solid state photomultiplier photometer - Mitchell G.W. and Hastings J.W. - Biol. Lab., Harvard Univ., Cambridge, Mass. 02138 - ANALYT.BIOCHEM. 1971 39/1 (243-250)

A miniaturized, solid state photometer that possesses the stability and accuracy of the original MacNichol design along with its calibrated gain settings. In addition the photometer was designed to supply up to 2000 V so that it may be used with end window photomultipliers requiring this higher operating voltage.

3129. 1 volt cell powers mini audio amplifier - Jackson D.G. - Resalab Inc., Garland, Tex. - ELECTRONICS 1971 44/3 (52)

An audio amplifier designed specifically for micropower applications features automatic gain control, a large dynamic range, and high efficiency from a low voltage supply.

3130. Amplifiers let voltmeter measure op amp noise - Gerdes R.C. - Optical Electronics Inc., Tucson, Ariz. - ELECTRONICS 1971 44/3 (50)

Special instruments are not needed to measure the noise generated by an operational amplifier. Peak to peak, root mean square, and even spectral density noise characteristics can be measured with an ordinary panel meter or digital voltmeter. The test circuit makes the amplifier under test (AUT) generate highly amplified noise peaks. These are detected and then simply scaled down to find the noise values. Measuring errors are less than 1%, small enough to test op amps for critical applications such as low level jobs, instrumentation, and video circuits.

3131. An improved distributed RC notch filter and its application to an extremely insensitive bandpass amplifier - Park S.B. - Dept. Electr.

Engin., Oregon State Univ., Corvallis, Ore. 97331 - PROC.IEEE 1971 59/2 (314-315)

A distributed RC notch filter with an improved frequency selectivity is described. An extremely insensitive bandpass amplifier can be obtained by use of such a filter.

3132. Distortion of a phase shift discriminator employing all pass network - Capparelli F. and Liberatore A. - Inst. Elettron. Radiocontr., Univ. degli Studi, Pisa - PROC.IEEE 1971 59/3 (420-421)

A phase shift discriminator employing an all pass network and suitable for fabrication in microminature circuit form is discussed. By expanding its transfer function into Taylor's series the harmonic distortion of the discriminator is analyzed.

3.3. Indicators

3133. FET pair bridges meter impedance gap - Theodore J. - Tri Electronics, Hammond, Ind. - ELECTRONICS 1971 44/3 (51)

Operating is a differential pair, 2 monolithic junction field effect transistors can increase the sensitivity of a high resistance bridge's galvanometer null detector. Accuracy of zero balancing thus is increased. The small, inexpensive FET circuit can be battery powered, and fits easily into bench or portable instruments. In fact, with carefully selected range resistors, the detector can serve as a good general purpose voltmeter.

3134. The variable response time method for eliminating signal waveform distortions owing to the electronic system - Hays W.J. and Knuth E.L. - Sch. Engin. Applied Sci., Univ. California, Los Angeles, Calif. 90024 - REV.SCI.INSTRUMENT. 1971 42/2 (273-274)

It was shown here that, if the detected signal has been distorted by the nonzero time of the detection system and if the detector impulse response is of a given type the maximum value of the detected signal is a point on the signal which would be obtained for zero detector response time. Hence, by varying the detector load resistance, i.e., by varying the detector response time, a signal which is free from electronic distortions can be developed.

3135. Semiconductor analog of scanning cathode ray tube - Bartelink D., Persky G. and Speeney D.V. - Bell Telephone Labs, Inc., Murray Hill, N.J. 07974 - PROC.IEEE 1971 59/2 (318-319)

A silicon structure in which a photoexcited electron beam is electrically deflected over an included angle of 22° has been used to detect a one dimensional optical image extending 100 μm. Five points of resolution were obtained: this is close to a theoretical estimate based on diffusion controlled beam spreading.

3136. Strain biased ferroelectric photoconductor image storage and display devices - Maldonado J.R. and Meitzler A.H. - Bell Telephone Lab. Inc., Murray Hill, N.J. 07974 - PROC.IEEE 1971 59/3 (368-382)

A device suitable for image storage and display application is described in which the image is stored as a spatially varying birefringence and can, by means of suitably polarized light, either be observed directly or projected onto a viewing screen. The basic device consists of a sandwiched structure of uniform thickness layers, comprising transparent electrodes, a photoconductive film, and a plate of fine grained ferroelectric ceramic. In order to establish a preferred orientation of the polarization in the plane of the plate, a uniform strain is induced in the plate by placing it either in tension or compression ('strain biasing'). The plate then becomes birefringent, with the principal axes of the optical indicatrix along the strain axes. The magnitude of this birefringence can be controlled by an electric field applied in the thickness direction, and this forms the basis of the device operation. In operation, the image to be stored is projected or scanned onto the photoconductive film. A voltage applied to the transparent electrodes develops, in the ceramic, a transverse field having an intensity modulated by the photoconductive film. When the field is removed, the desired image is stored as a spatial modulation of the birefringence of the ceramic plate. To erase the image the entire structure is flooded with light in the presence of an electric field in the reverse direction, and the plate regains its initial state of uniform birefringence. A large number of experimental devices have been fabricated and tested in the laboratory. In addition to describing the basic device structure, experimental results are presented showing the level of performance obtained from present devices, and a physical interpretation of device operation in terms of domain switching processes is provided.

3137. Simple high precision position indicator - Kyser D.S. and Jones V.O. - Michelson Lab., Phys. Div., China Lake, Calif. 93555 - REV.SCI.INSTRUM. 1971 42/5 (720-721)

The electrodes of a small neon glow lamp (e.g., type NE-2) glow on alternate half cycles when the lamp is driven by ac power. This effect and the technique of phase sensitive detection provide the basis of a simple device for accurately locating a preset (zero) position of a mechanical pointer.

3138. A digital ratio meter - Vaithilingam M.C. - Dept. Electr. Engin., PSG Coll. Technol., Coimbatore - INT.J.ELECTRONICS 1971 30/2 (197-199)

Ratio meters are widely used in process instrumentation. The ratio of two slowly time varying voltages can be obtained by using any of the familiar methods available. This paper describes a simpler method wherein the ratio of two slowly time varying voltages is digitally obtained and displayed at regular sampling intervals.

3139. High voltage amplifier offers high frequency, too - Cooke W.A. - Lockheed Missiles and Space Co., Sunnyvale, Calif. - ELECTRONICS 1971 44/9 (57)

Both high voltage and high frequency are hard to obtain in one amplifier. But if a common base voltage amplifier is added to a low voltage operational amplifier, both features can be achieved - and with excellent stability. The circuit can be used as a CRT cathode driver that delivers 50 volts, peak to peak, has a response of 10 megahertz, and is stable beyond 100 MHz.

3.4. Recorders

3140. Paper tape in cartridge features simplicity - ELECTRONICS 1971 44/5 (21-22)

The possibilities of a paper tape cartridge in many program handling by computers are mentioned. Some of the technical aspects of the construction of the cartridge made by Data Test Corporation are given. (Klijn - Nijmegen)

3141. Modulation scheme permits use of low cost recorder - ELECTRONICS 1971 44/8 (35)

Results as good as, or even better than, fm instrumentation recorders can be obtained with differential pulse width modulation. These results can be obtained with inexpensive audio decks. (Klijn - Nijmegen)

3142. A solid state light pen and computer interface for the Tektronix 611 storage oscilloscope - Leskovec R.A. and Bevington P.R. - Phys. Dept., Case Western Reserve Univ. Cleveland, Ohio, 44106 - REV.SCI.INSTRUM. 1971 42/5 (602-605)

A solid state light pen was developed to accommodate the phosphor characteristics of the Tektronix 611 storage oscilloscope. Computer interfacing for the scope includes remote control of the storage mode and expansion of both X and Y axes by a factor of 1-8 with variable trace positioning.

3.5. Generators

3143. An amorphous semiconductor RF switch - Stone J.L., Porter W.A., Linder J.S. and Haden C.R. - Inst. Solid State Electron., Dept. Electr. Engin., Texas A and M Univ., College Station, Tex. 77843 - PROC.IEEE 1971 59/2 (323-324)

Switching of an RF signal at 300 MHz by an amorphous semiconductor is reported. The material is $Si_3Ge_4As_{38}Te_{55}$, cut into a 1 mm^3 sample. Switching is accomplished by application of a 300 V pulse, with switching times less than 1 μs observed.

3144. A secondary reference voltage source stable to 1 ppm - Raamot J. - West. Electr. Co. Inc., Princeton, N.J. 08540 - REV.SCI.INSTRUM. 1971 42/4 (440-441)

The design of a simple parallel current regulation circuit has the following bandwidths: 10 MHz for voltage regulation, 0.2 Hz for the primary reference voltage circuit, and 20 Hz for amplifier noise. These characteristics compare very favorably to other voltage regulation circuits which are used in design of secondary reference voltage sources.

3.6. Telemetric devices

3145. Mutual inductance of air cored coils: Effect on design of radio frequency coupled implants - Flack F.C., James E.D. and Schlapp D.M. - Dept. Phys., Univ. Exeter, Devon - MED.BIOL.ENGINEERING 1971 9/2 (79-85)

Values of mutual inductance between 2 circular conductors lying in parallel planes have been computed. The results are presented in graphical form and their relevance to the design of radio frequency coupled implant systems is mentioned.

3146. Electret transducers applied to the telephone - Reedyk C.W. - North. Electr. Co. Ltd., Ottawa - IEEE TRANS.AUDIO ELECTROACOUSTICS 1971 AU-19/1 (1-5)

Successful application of electrets as telephone transmitter and less successful application as receivers are discussed. Amplifier gain and maximum input noise are derived from electret performance and system requirements. Simple corona charging is sufficient to produce stable fluorocarbon electrets with a useful life from 10 to 20 years. Two design approaches to compensate slackening of the electret diaphragm due to creep are described.

3147. A radiotelemetry stimulator for conditioning of large animals - Morton Caldwell W. and Judy A.B. - Dept. Psychol. Biophys., West Virginia Med. Cent., Morgantown, W. Va. 26506 - PSYCHOPHYSIOLOGY 1970 7/3 (499-502)

A radiotelemetry stimulator for the conditioning of large animals by the application of high voltage, short duration pulses to the skin surface is described. The system uses commercial radio control assemblies to simplify construction.

3.8. Cameras

3148. In situ preparation of specimens in the Philips EM300 electron microscope - Curzon A.E. - Phys. Dept., Simon Fraser Univ., Burnaby 2, British Columbia - REV.SCI.INSTRUM. 1971 42/4 (545-546)

Evaporators were designed for use in various electron microscopes. These devices enable the processes of nucleation and growth to be studied as they occur when a vapor condenses on a substrate. In view of the importance of such studies the author has developed an evaporator for use with the Philips instrument.

3149. A simple replica technique for the scanning electron microscope - Carpenter G.J.C. - Chalk River Nucl. Lab., Atom. Energy of Canada Ltd., Chalk River, Ontario - REV.SCI.INSTRUM. 1971 42/4 (531-532)

The scanning electron microscope is well established as a valuable tool for the examination of surfaces. For example, a common use is the study of fracture surfaces. Relatively large specimens (of the order of 1 cm) can be examined directly and the only preparation required with conducting specimens is to mount them so as to fit in the specimen stage of the microscope. Under certain circumstances, it is useful to make use of replicas of the surface to be examined and a simple technique has been developed to facilitate this.

3150. A novel rate meter eyepiece for the electron microprobe - Moore V.E. and Packwood R.H. - Phys. Metallurgy Lab., Mines Branch, Dept. Energy, Mines and Resources, Ottawa - REV.SCI.INSTRUM. 1971 42/4 (533-534)

The electron microprobe (probe) operator frequently encounters the problem of surveying the concentration of particular component elements in a sample. Most probes have an optical microscope for observing the region which the electron beam is striking. The ability to see the region analyzed is very important and should be utilized to the fullest extent, but for the operator to continually switch attention to and from the eyepiece and separate rate meters is unsatisfactory. The way out of this dilemma is to make the rate meter reading available to the probe operator without requiring any ocular movement or refocusing. This can readily be achieved by introducing either the rate meter or its image into the operator's field of view. Several means of doing this are outlined.

4. COMPUTERS

3151. Parameter estimation in simulation models - L'ESTIMATION DES PARAMETRES DES MODELES DE SIMULATION - Beaugas C. and Comyn G. - Serv. Developpem. Sci. IBM France, Neuilly - REV.INFORM.MED. 1970 1/4 (291-302)

When one constructs a model of a biological phenomenon and when one compares the theoretical results with the actual experimental data, the problem arises of estimating the numerical parameters occurring in the structure of the model. This operation provides a means of testing properly the validity and consistency of the hypotheses inherent in the model. A programme designed for this purpose is set out. This programme has been written in language form to permit flexible and general application.

3152. The public health uses of electronic computers. Report on a Seminar convened by the Regional Office for Europe of the World Health Organization, London, 17 to 21 June 1968 - WHO, REG.OFF.EUROPE, COPENHAGEN 1969 (34 p.)

This report describes medical record linkage; a medical data system under the auspices of the Kaiser Permanente Medical Care Programme in San Francisco; and three uses of computers for the call up of patients for blood transfusion, cervical cytology screening and immunization, respectively. These descriptions are preceded by a review of the discussions which took place on various aspects of computerized medical records. Brief mention is also made of computer assisted diagnosis and of certain developments of information handling in the World Health Organization.

3153. A micrologic integrated circuit for monitoring correlation in pulse sequences - Pacilio N., Ferrari T. and Lorenzi P. - Lab. Fisica Calcolo Reattori, C.S.N. Casaccia, Comitato Naz. Energia Nucl., Rome - NUCL.INSTRUM.METH. 1971 92/1 (13-17)

The problem is faced of monitoring time correlation within pulse sequences, which are partially random but also contain events linked by a correlation law. Structure, logic operation and applications are described of an ad hoc device-called 'correlation monitor' which is capable of spotting the most significant portions of pulse sequences and of enabling the storage of data only when a conspicuous fraction of correlated events is present. This type of monitor is indispensable in order to make some neutron noise time analysis techniques applicable in thermal and fast nuclear reactor systems.

3154. Respiratory instrumentation computer - Leeming M.N. and Howland W.S. - Dept. Anesthesiol., Mem. Hosp. Cancer Allied Dis., New York, N.Y. 10021 - RESP.PHYSIOL.(Amst.) 1971 11/3 (384-389)

A respiratory volume computer which utilizes pulse width, pulse height modulation is presented. Sampling techniques are used to provide time delay compensation for gas transport lag. No electronic multipliers are required; therefore, the machine can easily be expanded to process a multitude of gases. This machine is arranged to process 3 gases, namely carbon dioxide, nitrogen, and oxygen. Running records of inspired and expired volumes of each gas and tidal volumes are machine outputs as well as are instantaneous gas concentrations. This presentation has 2 purposes which are to present the mathematical techniques employed and to demonstrate the method through which the electronics is arranged to perform the mathematics.

3155. A digital recording system for respiratory variables - Bradley G.W. and Mustafa K.Y. - Dept. Physiol., Univ. Bristol - RESP.PHYSIOL.(Amst.) 1971 11/3 (390-398)

A method is described which enables various respiratory parameters to be presented in digital form. It consists of processing analog signals from conventional recording apparatus using operational amplifier circuits and a Devices Digitimer. The final signals are put into a Biomac 500 computer, which is used as an analog to digital converter with storage facilities, and the digital reading is printed out using a teletype. Depending on the number of inputs, analyses of 125-500 breaths is possible before the results have to be printed out. Examples of how the method may be applied to the measurement of the respiratory response to elastic loading in cats and to rebreathing in rabbits and man are given.

4.2. Analog

3156. Nonlinear elements offer analogue solutions - Gledhill B. - ELECTR.ENGINEERING 1971 43/519 (70-73)

Advances in processing and testing of semiconductor devices have produced elements suitable for performing logarithmic and other nonlinear functions with considerable accuracy. Two fundamentally different techniques are available using inherently nonlinear devices (semiconductor junction characteristics) and combined diode resistor networks forming synthesised function generators.

4.3. Digital

3157. Frequency domain analysis of neurophysiological data - French A.S. and Holden A.V. - Dept. Physiol., Univ. Alberta, Edmonton - COMPUT.PROGR.BIOMED. (Amst.) 1971 1/4 (219-234)

Six programs are described which constitute a Spectral Analysis Package for the Digital Equipment Corporation LAB-8 computer and a random access magnetic storage device. The programs allow a wide range of data processing to be carried out in the frequency domain on neurophysiological observation in the form of analog voltage or spike train signals. Transformations between the time and frequency domains are possible in either direction using the Fast Fourier Transform Algorithm. Commencing with 2 observed signals the programs permit the calculation of power spectral density, coherence, describing, auto and cross correlation functions as well as providing techniques for the averaging of successive calculations in order to improve spectral estimates. Mathematical manipulation is provided by modifications to the interpretive language FOCAL which permit powerful flexibility to operate on data in a variety of formats. All data is stored in files within the Disc Monitor System so that the programs may be used on a machine which is also serving other purposes.

3158. Modern approach to the design of digital counters - Ayres N.L. - ELECTR.ENGINEERING 1971 43/516 (52-54)

The problems facing the designer of digital instruments are formidable. There is a wide variation between the demands of different customers which makes the design of a general purpose instrument to satisfy all requirements virtually impossible. To meet the needs of a reasonable cross section of customers, it is necessary to produce a range of instruments, some of which will have a limited demand.

3159. Using mini computers in systems engineering - Mutzeneek J.I. - ELECTR.ENGINEERING 1971 43/516 (45-47)

The advent of the mass produced mini computer has created interesting new approaches for the systems engineer, while configuring a large computer system. Increasingly the answer to system design is being found by assigning specific jobs to separate processing units and then connecting them all together under the control of another mini computer. The solutions are often linked closely to the i/o bus of the mini computer itself.

5. SPECIFIC MEASUREMENTS

3160. Reusable metal sealing gasket - Frohn A., Schafer J.H. and Seidensticker J. - Inst. Allgemeine Mech., RWTH, Aachen - REV.SCI.INSTRUM. 1971 42/5 (727)

A metal sealing gasket is described. Metal seals which are applied at extremely low and high pressures have the advantage (if the material is properly chosen) that they can resist radiation, chemical influences, and high temperature. The latter property made them the sealing element par excellence for uhv techniques. Gold and copper gaskets are most common in that technique. These gaskets have the disadvantage of being rather costly and, in addition they can be used only once. In this note it is shown that by a properly selected groove a reversible sealing gasket is obtained which can be reused indefinitely.

3161. A new look at industrial pH measurement - Jamieson D. - INSTRUM.PRAC. 1971 25/5 (272-274)

In process applications where continuous onstream measurement and control of pH are critical factors, most present day pH meter/controllers fall lamentably short in providing long term drift free operation. The primary causes of instability in pH sensors are discussed.

5.1. Temperature

3162. A nomogram for calculation of the wet bulb globe temperature index - Kuehn L.A., Stubbs R.A. and MacHattie L.E. - Defence Res. Establ., Toronto - CANAD.J.PHYSIOL. 1970 48/12 (832-834)

A device is described that facilitates the calculation of the wet bulb globe temperature index. It consists of a small nomogram on which two scales, representing the dry bulb temperature, the natural wet bulb temperature, and the globe temperature, are inscribed so that reference to these scales with two movable cursors results in computation of the WBGT index at a third scale.

3163. Design of a low zero drift thermocouple element - Aslan E.E. - Narda Microwave Corp., Plainview, N.Y. - IEEE TRANS.INSTRUM.MEASUREMENT 1971 IM-20/1 (16-19)

The criteria for the optimum design of a low zero drift thermocouple element for coaxial line power measurement is established. A procedure is presented for determining the thermoelectric voltages of a circuit and the geometric design of the element. The thermal and electrical resistivity of the component parts of the element are derived.

5.3. Frequency

3164. Theoretical response of a polar display instantaneous frequency meter - Myers G.A. and Cumming R.C. - Dept. Electr. Engin., Naval

Postgrad. Sch., Monterey, Calif. 93940 - IEEE TRANS.INSTRUM.MEASUREMENT 1971 IM-20/1 (38-48)

Polar display instantaneous frequency meters are finding increasing application as frequency monitor receivers and as modulation analyzers. These systems indicate signal frequency by the angular coordinate of a cathode ray tube spot and signal amplitude by the radial coordinate. This paper derives the responses (spot loci) produced by signals of interest, including the sum of two sinusoids, amplitude modulated carriers, angle modulated carriers, and carriers with combined amplitude and angle modulation. Differences between actual responses and responses expected from a static analysis are studied. Conditions under which the amplitudes and frequencies of two simultaneously applied sinusoids can and can not be determined from the display are derived.

5.4. Pressure

3165. A capacitive gauge for the accurate measurement of high pressures - Andeen C., Fontanella J. and Schuele D. - Case Western Reserve Univ., Cleveland, Ohio 44106 - REV.SCI.INSTRUM. 1971 42/4 (495-496)

A highly accurate and precise pressure gauge, which utilizes the 35°C, 2005 Hz dielectric constant of an ionic crystal CaF_2, is presented. The prototype gauge was calibrated at the National Bureau of Standards over the pressure range 0-2.5 kilobars. The gauge is stable and accurate over this range at the 0.01% level, and indications are that this type of gauge may be useful at much higher pressures and refined to even higher accuracies.

5.5. Flow

3166. Resolution of the laser fluid flow velocimeter - Wilmshurst T.H. - Dept. Electron., Univ., Southampton - J.PHYS.E:SCI.INSTRUM. 1971 4/2 (77-80)

Approximate expressions are obtained for the velocity resolution of Rudd's laser fluid flow laser velocimeter when used with a spectrum analyser or with a pulse counting discriminator. The expressions are also valid for the several preceding variants of Rudd's scheme. The theory is supported by resolution measurements made using an analogue simulation of the velocimeter.

3167. On the electromagnetic vortex probe - Baker R.C. - Dept. Engin., Univ., Cambridge - J.PHYS.E:SCI.INSTRUM. 1971 4/2 (99-101)

The calibration of an electromagnetic vortex probe is described, and the results are shown to agree with theoretical predictions. Some of the problems of such a probe are discussed.

5.7. Volume

3168. On calculating volumes of transsected bodies from two dimensional micrographs - Lindberg L.G. and Vorwerk P. - Inst. Pathol., Univ. Lund - LAB.INVEST. 1970 23/3 (315-317)

A general formula for calculating the volume of transected bodies from micrographs is presented, and applications for ellipsoid and cylindrical bodies are given. The formula is valid for bodies distributed at random in space, and it is shown that the numerical value of the dimensionless coefficient β in the general formula $V= a^3\ \beta\ a^3$ be related to the numerical value of the ratio between the perpendicular axis to the axis of rotation in bodies with a rotational symmetry. This relation is expressed in a diagram for ellipsoids and cylinders, and a few numerical values are given.

5.11. Electric phenomenons

3169. Fluctuations with a 1/f spectrum in the conductance of ionic solutions and in the voltage of concentration cells - Hooge F.N. and Gaal J.L.M. - PHILIPS RES.REP. 1971 26/2 (77-90)

The conductance of ionic solutions shows 1/f noise. The magnitude of the noise is inversely proportional to the number of ions in the sample, with a proportionality constant α that is 10^3 to 10^4 times higher than for electrons in solids. The constant α is proportional to the electrolyte concentration. The cell voltage of concentration cells also shows 1/f voltage fluctuations. The same value for α is found from voltage fluctuations and from conductance fluctuations.

3170. A new glue holds rigid cup ECG skin electrodes for 24 hr and longer - Bloch Jr W.N. and Lewis T.R. - Biol. Res. Branch, Div. Hlth Effects Res., Bur. Criteria, Stds., Environm. Protect. Agency, Air Pollution Contr. Office, Cincinnati, Ohio 45237 - J.APPL.PHYSIOL. 1971 30/6 (893-894)

In 200 applications, isobutyl 2 cyanoacrylate monomer kept rigid cup type electrodes attached to skin, with electroconductive cream enclosed, for a 24 hr period in free ranging dogs. In 40 applications of more than 24 hr, the failure rate was 2.5%. This technique shows promise for long term human and animal application in radioelectrocardiography.

5.12. Gas concentration

3171. A fast responding oxygen sensitive electrode with high output current for respiratory gas analysis - Distelbrink C.A. and Mollevanger W.J. - Inst. Med. Phys. TNO, Utrecht - TNO NIEUWS 1970 Suppl. 2 (131-139)

An oxygen sensitive electrode is described which has a short response time (90% of step change within 0.4 sec. or less) and relatively high output current: 6 μA/% 0_2 under normal conditions. This transducer is based on the polarographic principle and contains an Ag -

AgCl reference electrode and a working electrode of silver or gold. This last metal is directly evaporated onto the membrane.

3172. A solid state fiberoptics oximeter - Johnson C.C., Palm R.D., Stewart D.C. and Martin W.E. - Electr. Engin. Dept., Univ. Washington, Seattle, Wash. 98105 - J.ASS.ADVANC.MED.INSTRUMENT. 1971 5/2 (77-83)

An all solid state fiberoptic catheter oximeter instrument has been designed, calibrated in vitro, and put into initial clinical operation. Extensive in vitro calibration tests have been performed, with data points falling to within 2.7% of a straight line result. From these data, calibration constants have been obtained for a no. 5 French and no. 7 French fiberoptic catheter. The oximeter calibration was found to be independant of temperature variations, and independant of hematocrit variations above 40%. The oximeter calibration is shifted approximately 1%/0.1 pH unit.

3173. Evaluation of a light reflection oximeter - Lopez Majano V., Alfredson K.S., Chmar W. and Kearns K. - Nucl. Med. Serv., VA Hosp., Hines, Ill. 60141 - AMER.J.CLIN.PATH. 1971 55/6 (701-704)

Of the methods utilized to measure the oxygen saturation of the blood, oximetry is one of the fastest. The purpose of this study was the evaluation of a light reflection oximeter. Per cent oxygen saturation values of arterial blood tonometered with gases of various oxygen concentrations were measured with a light reflection oximeter and compared with results obtained by spectrophotometric analysis and the O_2 saturation calculated from the O_2 dissociation curve from pO_2 and pH data. In the area of greatest clinical importance, between 70% and 90% oxygen saturation, the oximeter results correlated well with those obtained by the other methods. Thus, the light reflection oximeter provides an easy and reliable method to measure the oxygen saturation for clinical evaluation.

3174. Cuvette for continuously measuring blood oxygen tension - Feigl E.O. and D'Alecy L.G. - Dept. Physiol., Univ. Pennsylvania, Philadelphia, Pa. 19104 - J.APPL.PHYSIOL. 1971 30/6 (909-911)

An oxygen electrode cuvette has been designed which permits continuous measurement of arterial or venous oxygen tension. The advantage of the design is that good mixing is obtained at the electrode face at low flow rates by directing a jet of blood against the electrode. A small cathode and a thin Teflon membrane are used, giving a 90% response time of less than 3 sec. The cuvette is constructed so that the calibration may be easily achieved without disturbing the electrode or its membrane covering. The system has been used to record oxygen tension continuously from the coronary sinus and femoral artery in dogs but can be adapted for recording from almost any vessel with a flow greater than 3-5 ml/min.

3175. An automatic method for chromatographic gas analysis using a helical gas collector - Sodal I.E., Corbin L.V., Weil J.V. and Filley G.F. - Univ. Colorado Med. Cent., Webb Waring Inst. Med. Res., Denver, Colo. 80220 - J.APPL.PHYSIOL. 1971 30/6 (921-922)

Automating the analysis of discrete gas samples has been difficult mainly because only manual methods are available for collecting samples and unloading them into the analyzer. A rotating helical gas collector has been developed which may be loaded and unloaded automatically at a preset or controlled rate. The collector may be designed to hold any number and size of samples. The one reported in this paper contains 23 samples, each having a volume of 20 ml. The gas is contained in a glass helix, the samples being sealed off by mercury in the bottom of each loop. The sampler can easily be interfaced with a gas chromatograph and operated by a computer.

5.14. Radiation

3176. Interlaboratory comparison of analysis of tritium in natural waters - Florkowski T., Payne B.R. and Sauzay G. - Internat. Atom. Energy Ag., Vienna - INT.J.APPL.RADIAT 1970 21/8 (453-458)

The results of analyses of Tritium in natural waters made by 35 laboratories are compared. Three water samples in a concentration range of 10-250 T.U. were used for the intercomparison. Analyses were effected by liquid scintillation and gas counting with and without electrolytic enrichment. The results form the basis for conclusions regarding the optimal concentration range for each method of assay.

3177. A small source for multiply charged heavy ions - Prelec K. and Isaila M. - Princeton Pennsylvania Accelerator, Princeton, N.J. 08540 - NUCL.INSTRUM.METH. 1971 92/1 (1-6)

A small, compact ion source of the P.I.G. type is described, with a pulsed magnetic field and end extraction. The source has been tested with N, CO, Ne, A, Kr and Xe and ion spectra are presented. Pulsed currents of C^{2+}, N^{3+}, Ne^{3+}, A^{3+}, Kr^{3+} and Xe^{4+} to Xe^{6+} between a few tens and one hundred μA or more were obtained, with an extraction aperture of 0,75 mm diameter. Although the relative yields of multiply charged ions are lower than from ion sources with side extraction, the described source has certain advantages as to its small size and low total power consumption.

5.14.1. Visible light

3178. A method for obtaining microsecond risetime step function high intensity light pulse - Weisz S.Z., Levinson J. and Cobas A. - Puerto Rico Nucl. Cent., Dept. Phys., Univ. Puerto Rico, San Juan - REV.SCI.INTRUMENT. 1971 42/2 (261-262)

A high intensity step function light pulse with a risetime of the order of 1 μsec was needed in the laboratory to perform measurements of continuous injection transient space charge limited current in solids. Such a light pulse can be a very useful experimental tool in radiation chemistry also. With mechanical shutters in which a capacitor is discharged via a thin aluminium foil it is possible to obtain opening times of approximately 30 μsec. The Kerr cell type shutter can be closed very fast (approximately 25 nsec), however, it seems that fast opening Kerr cell shutters for high light intensities are not yet available. A method by which a fast risetime (approximately 1 μsec), step function high intensity light pulse can be obtained is described. In this method a Q switched laser is used to punch a hole in a graphite film placed in the path of a continuous light source.

3179. An efficient light collector - Brown D.C. - Dept. Phys., Univ. Syracuse, N.Y. 13210 - REV.SCI.INSTRUM. 1971 42/5 (729)

Modern light scattering systems must generally be capable of detecting very weak signals. Mooradian has described an ellipsoid of revolution employed to focus Raman signals onto the entrance slit of a spectrometer, thus maximizing the input signal. The problem of collecting light from the spectrometer exit slit and focusing it efficiently onto the surface of a photomultiplier tube, however, can often be a formidable one. Most systems employ lenses which collect only a fraction of the light, and further decreases in efficiency result through absorption and reflection. In designing our Raman spectrometer, the above losses were eliminated through the use of an elliptical light collector. A cavity, whose dimensions are determined by the length of the spectrometer exit slit and the diameter of the photomultiplier tube, was fashioned into an elliptical shape and the ends were cut off at the positions of the two foci.

3180. Imaging characteristics of photodetectors operating in the photon integration mode - Nill N.B. - Perkin Elmer Corp., Norwalk, Conn. 06852 - APPL.OPT. 1971 10/3 (686-687)

This Letter describes mathematically the imaging process of a phototransistor or photodiode operating in the photon integration mode, and a convenient method for analytically determining its spatial frequency response.

3181. Research - from the magic lamp - Gledhill B. - ELECTR.ENGINEERING 1971 43/519 (55-58)

The Philips organisation owes its existence to the discovery of the 'electric light' and in this field the company has, since 1891, been a leading manufacturer and innovator. Of necessity the company has diversified, and the research facilities expanded accordingly, to meet the demand for a capable and useful r. and d. center that could cope with an extraordinarily wide range of subjects.

3182. A new method for absolute calibration of electro optic modulators - Peterson R.W. and Jahoda F.C. - Los Alamos Sci. Lab., Los Alamos, N.M. 87544 - REV.SCI.INSTRUM. 1971 42/4 (532-533)

A convenient method for producing small changes in phase at high frequencies involves the use of the electro optic effect in a crystal transparent at the interferometric wavelength. The authors describe a simple method which was useful in accomplishing this calibration in the case of a GaAs crystal used in modulating a 10.6 μ interferometer.

3183. A new double beam optical lever refractometer and the variation of the refractive index of NaCl with temperature - Pereira F.N.D.D. and Hallett A.C.H. - Dept. Phys., Univ. Toronto - REV.SCI.INSTRUM. 1971 42/4 (490-493)

The design and construction of a double beam optical lever are described. Its use is illustrated by describing an experiment to measure changes of the order of 10^{-5} in the refractive index of NaCl by the method of measuring the change in angle of refraction of a beam of light by a prism of the salt. It is capable of higher sensitivities and has the advantage that it can monitor the motion of the crystal as a whole.

5.14.3. Infrared

3184. A new type of gallium arsenide field effect phototransistor - Swartz G.A., Gonzalez A. and Dreeben A. - RCA Labs, Princeton, N.J. - R.C.A. REVIEW 1971 32/1 (24-41)

A gallium arsenide field effect phototransistor, which responds to infrared radiation at a wavelength of 1.5 μm, has been developed. The device is fabricated from chromium doped semi insulating GaAs with a thin epitaxial n type surface layer. The carrier depletion field exists in the p+ n type junction formed between the substrate and the epitaxial layer. The radiation serves to increase the depletion field by decreasing the substrate resistance. The phototransistor has a small signal power gain of 30 dB. The noise equivalent power of the device at 1.5 μm is 10^{-6} watt/cm^2.

3185. Area and wavelength sensitivity of a photomultiplier - Ballik E.A. - Engin. Phys. Dept., McMaster Univ., Hamilton, Ontario - APPL.OPT. 1971 10/3 (689-691)

The photocathode area sensitivity results presented by Youngbluth and by Reif do not include the effects of wavelength. This Letter reports on data which illustrate that the photocathode area sensitivity contours can change significantly with wavelength. The data were obtained in conjunction with the absolute intensity calibration of a photomultiplier and its subsequent application to laser research in the near infrared region of the spectrum.

3186. Optical constants of far infrared materials. I: Analysis of channeled spectra and application to Mylar - Loewenstein E.V. and Smith D.R. - Air Force Cambridge Res. Lab., Optical Phys. Lab., Bedford, Mass. 01730 - APPL.OPT. 1971 10/3 (577-583)

A method is presented for analyzing channeled spectra to determine optical constants, using fourier spectroscopy. The use of fourier spectroscopy is integral to the method, for a single signature of the channeled spectrum in the interferogram may be used to yield both real and imaginary parts of the refractive index. The method employed for handling the data permits use of the position of zero crossings to calculate the real refractive index rather than maxima and minima which cannot be located with the same precision. Determination of the order number of the zero crossings is discussed, as is the correction for the convergence of the illumination. Results are given for Mylar, a birefringent material, in the 50-250 cm^{-1} region.

5.14.4. Radiowaves

3187. Capacitively and inductively foreshortened cavities for magnetic resonance spectroscopy - Guenther B.D., Christensen C.R., Jensen R.A. and Daniel A.C. - U.S. Army Missile Command, Redstone Arsenal, Ala. 35809 - REV.SCI.INSTRUM. 1971 42/4 (431-434)

Two types of cylindrical reentrant cavities are described for magnetic resonance and ultrasonic applications in the 0.1-1.0 GHz frequency region. The physical size of these cavities is reduced by introducing large capacitive and inductive elements into the cavity. Tuning, rf coupling, and temperature control techniques are described for operation at low temperatures.

5.14.6. α, β and γ radiation

3188. Medical radioisotope scanning - Owen G.M. and Kirkman S. - Univ. Hosp., Cardiff - BIO-MED.ENGINEERING 1971 6/2 (54-61)

This article is an introductory review of scanning techniques in nuclear medicine, with especial reference to mechanical (moving detector) scanners. The use of radiopharmaceuticals, the components and operation of scanning systems and the display, recording and processing of count data are discussed. Some applications of gamma cameras and mechanical scanners are outlined and compared.

3189. Design of a simple cryostat for thermoluminescence measurements on solid state low thermal conductivity samples - Fleming R.J., Legge C.A., Ranicar J.H. and Boronkay S. - Dept. Phys., Monash Univ., Clayton, Victoria - J.PHYS.E:SCI.INSTRUM. 1971 4/4 (286-288)

A liquid nitrogen cryostat, suitable for the recording of thermoluminescence glow curves and for the spectral analysis of these curves is described. The necessity of maintaining isothermal conditions within the samples during both irradiation at 77°K and subsequent heating to 273°K is emphasized. Some results are presented for polyethylene and polystyrene.

5.14.7. Neutrons

3190. A liquid deuterium target for the production of a monoenergetic neutron beam - Bubb I.F. - Dept. Phys., Univ. Manitoba, Winnipeg - NUCL.INSTRUM.METH. 1971 94/1 (29-32)

A cryogenic liquid deuterium target has been constructed for use in the production of a 0.75 neutron beam by the D (p,n) 2p reaction. The cryostat is refrigerated by liquid helium which is continuously transferred to the cryostat at low rates (approx. 1.0 1/h). When used with protons of energies between approximately 20 and 50 MeV, the peak in the neutron energy spectrum lies in the energy range 18 to 47 MeV. The neutron beam is used in an experimental program measuring neutron cross sections.

3191. Damage to biological samples caused by the electron beam during electron microscopy - Thach R.E. and Thach S.S. - Lab. Biophys., Inst. Biol. Molec., Univ. Geneve - BIOPHYS.J. 1971 11/2 (204-210)

A new method has been developed which measures directly the beam damage suffered by biological specimens in the electron microscope. This method involves the use of radioautography to measure specific radioactivity of labeled specimens, either exposed or unexposed to the beam. Using this technique, it has been found that macromolecular samples such as ribosomes and R17 virions are severely damaged during standard electron microscopic operations: from 15 to 40% of the mass of the sample may be lost in a 30 sec exposure to the beam.

5.14.9. Sound

3192. Method for selecting of vibrations of different directions - METHODE DE SELECTION DE VIBRATIONS DE DIRECTIONS DIFFERENTES - Clair J.J. - Inst. Optique, Paris - OPT.ACTA 1971 18/1 (47-50)

After an examination of the possibility of selecting a privileged vibration of a set of coherent vibrations the amplitudes of which vary in geometric progression, an application of the method to a particular case of a new type of interferometer using the Faraday effect is described.

6. SPECIALIZED INSTRUMENTATION

3193. A new method of housing axolotls and other aquatic amphibians - Justus J.T. and Cullum L. - Dept. Zool., Arizona State Univ., Tempe, Ariz. 85281 - LAB.ANIM.SCI. 1971 21/1 (110-111)

A 2 tank, 14 cage per tank stainless steel unit was designed to house aquatic amphibians. Filtered, germicidally treated water is circulated at the rate of 250 gallons per hour. This method of housing reduces feeding and cleaning time.

3194. An engineering assessment of viable organ procurement - Freedman F.B. - Applied Sci. Div., Litton Syst., Inc., Minneapolis, Minn. 55427 - J.ASS.ADVANC.MED.INSTRUMENT. 1971 5/2 (87-90)

The problems associated with providing viable organs for transplantation are reviewed with current techniques of organ preservation being examined. To date, the economic and technical feasibilities of providing a supply of viable organs for transplantation have yet to be assessed rigorously. Presently, too much effort is being placed upon organ preservation without considering the many broader problems associated with viable organ procurement. The progress and direction of research associated with organ preservation are examined.

3195. The centre of medical information of the faculty of medicine and of the university hospitals of Brussels - LE CENTRE D'INFORMATIQUE MEDICALE DE LA FACULTE DE MEDECINE ET DES HOPITAUX UNIVERSITAIRES DE BRUXELLES - Verniory A. - Cent. Informat. Med., Fac. Med., Univ. Libre, Bruxelles - BRUX.MED. 1971 51/3 (171-174)

The Medical Information Center, established by the Faculty of Medicine of the Free University of Brussels, has the task of working out the development of information retrieval for the various fields of experimental and clinical medicine. The Center has 3 departments: medical and hospital management and organization; physio pathological information; scientific calculation. A description is given of the projects of the Center and of its first few accomplishments.

3196. Radiographic identification of calcifications in breast specimens - Wallace T.I. - Dept. Radiol., Mem. Hosp. Cancer Allied Dis., New York, N.Y. 10021 - RADIOL.TECHNOL. 1969 40/4 (211-215)

The radiographic examination of surgically removed breast tissue is an important and sometimes necessary procedure for locating calcifications when surgery is done as a result of mammographic findings. The identification of calcifications present in the specimen can assure the surgeon that the proper area has been removed, and the area is localized for histological studies. The radiographic screening of all breast tissue is a vitally important procedure as proved by the discovery of 12 cases of carcinoma which otherwise would have gone undetected by the pathologist.

3197. The determination of shear strength. A method using a micro punch apparatus - Smith D.C. and Cooper W.E.G. - Fac. Dent., Univ. Toronto - BRIT.DENT.J. 1971 130/8 (333-337)

The shear strength of enamel, dentine, cast polymethylmethacrylate, dental amalgam and silicate was determined by measuring the force required to push micro punches of diameters 100, 200 and 300 μm through plane sections of the materials. The shear strength of enamel and dentine was variable within one tooth and between teeth. In general, dentine was stronger than enamel with the amelodentinal junction stronger than both. The dentine was weaker in the vicinity of the pulp. Amalgam was stronger and the acrylic material similar compared to dentine. The silicate was much weaker, having only one fifth the shear strength of the amalgam.

3198. Focusing on water pollution - ELECTRONICS 1971 44/10 (12E-13E)

An optoelectronic instrument that can determine water turbidity right on the spot is described. There is no need for water sampling, which is time consuming and unsuitable for continuous testing of large bodies of water. Two basic units, a light projector and a receiver, are housed in separate brass cylinders about 16 inches long and 3 in. in diameter. The amount of light actually received measures the water's turbidity or fluorescence.

6.1. Metabolism

3199. Primate restraint system for studies of metabolic responses during recumbency - Howard W.H., Parcher J.W. and Young D.R. - Biomed. Res. Branch, Ames Res. Cent., NASA, Moffett Field, Calif. 94035 - LAB.ANIM.SCI. 1971 21/1 (112-117)

A system is devised to restrain primates, seemingly without adverse effect on the animal. The system provides a means for study of bone resorption and calcium metabolism in monkeys, and would be useful for other kinds of studies requiring restraint alone or with recumbency.

3200. Urine collection from individual rats - Cruickshanks J. and Wood L.C. - Geigy (UK) Ltd, Stamford Lodge, Altrincham Road, Wilmslow - J.INSTIT.ANIM.TECHN. 1970 21/1 (25-28)

A metabolism unit is described which allows urine to be collected from animals housed singly. The system is simple to use, and troublefree in operation.

6.3. Digestive tract

3201. Investigation of copper manganese nickel alloys for dental purposes - Wald F.V. and Cocks F.H. - Tyco Lab., Inc., Bear Hill, Waltham, Mass. 02154 - J.DENT.RES. 1971 50/1 (48-59)

Four alloys of specified composition in the Cu Mn Ni system were tested with respect to their casting behaviour under dental laboratory conditions and their electrochemical corrosion behaviour in solutions of artificial saliva at 37 C. Results of the testing indicated that it is feasible to develop non noble metal dental casting alloys with melting points in the range of 1,000 C on the basis of the Cu Mn Ni system.

6.5. Blood

3202. The influence of the particle line on the volume distribution according to the Coulter principle - DER EINFLUSS DER PARTIKELDURCHTRITTSBAHN AUF DIE VOLUMENVERTEILUNGSKURVEN NACH DEM COULTER VERFAHREN - Kachel V., Metzger H. and Ruhenstroth Bauer G. - Max Planck Inst. Biochem., Munchen - Z.GES.EXP.MED. 1970 153/4 (331-347)

A measuring chamber is described which functions according to the Coulter principle and with which one can produce adjustable, optically distinguishable particle pathways across the entire measuring orifice. Different pathways through the orifice for particles of a given volume result in different measured values of up to 80% for the volume. The volume distribution for each individual pathway is approximately symmetrical; these individual distributions are weighted by a fluid velocity profile factor and then superimposed to yield a total, right skewed distribution, theoretically the same as that obtained with an unmodified Coulter capillary where the volume distribution is comprised of all possible pathways. Comparison of the area of this synthetic distribution curve with that of the axial pathway yields a ratio of 1.39, in close agreement with the corresponding ratio of 1.45 for the unmodified Coulter capillary. Particle deformation and rotational alignment during passage through the orifice are also investigated. Forty nanosecond exposure photographs of native erythrocytes and of fixed erthrocytes in the axial region and near the orifice walls show that cell deformation occurs throughout the entire orifice and an occasional cell near the wall rotates but none in the axial region does so.

3203. The reversible line: a statistical comparison of two methods of measurement. Application to electronic particle counters - Salmon D., Cartron J., Giard M.H. et al. - Groupe Rech. Inform. Med., Paris - REV.EUROP.ETUD.CLIN.BIOL. 1970 15/10 (1132-1140)

When two different methods of measurement provide two series of results and a comparison is asked for, the calculation of the "reversible line" is based on two requirements. First, one minimizes the loss of precision by not using the classical regression method. Second, one equalizes this loss of precision when translating the result from measurement 1 into measurement 11 and translating the result from measurement 11 into measurement 1. One obtains the formula: (Y-Y)/Sy=(X-X)/Sx. This formula, together with a comparison of results by analysis of variance and examination of the plot of results, provides a useful method of comparison and translation of two series of measurements in physiologic or biologic research.

6.7. Circulation

3204. Measurement of blood pressure using a portable recorder operated by the patient - Conway N., Rubenstein D., Emanuel R. and Gibbons D. - Dept. Cardiol., Middlesex Hosp., London - CARDIOVASC.RES. 1970 4/4 (537-544)

A portable blood pressure recorder operated by the patient is described. It registers blood pressure by the conventional auscultatory method and record the results automatically. In part I of the study its accuracy was compared with simultaneous sphygmomanometer readings in the same arm. 73% of systolic and 82% of diastolic pressures were accurately reproduced (within 5 mm Hg) and in only 1% of instances was there poor agreement between the two methods. The causes of the discrepancies are briefly discussed. In part II of the study the recorder was used to investigate the blood pressure of 7 normal and 9 hypertensive patients in hospital. In both groups while the recorder was being worn, diastolic pressures were lower than in control periods in which the blood pressure was measured by the standard clinical method, which was probably due to the removal of an iatrogenic pressor influence.

3205. Registration and evaluation of functional hemodynamic courses with the new 'Mainz' 12 channel function measuring apparatus - ERFASSUNG UND AUSWERTUNG HAMODYNAMISCHER FUNKTIONSABLAUFE MIT DEM NEUEN 12 KANALFUNKTIONSMESSSTAND 'MAINZ' - Mundschenk H., Fischer J. and Wolf R. - I. Med. Klin., Univ. Mainz - INT.J.APPL.RADIAT 1970 21/8 (471-485)

The multichannel function test device which is described allows the simultaneous measurement of radioactivity at several sites of the body and the observation of very fast proceeding hemodynamic processes. The data, stored in the memory of a multiscaler, are smoothed as regards the statistical fluctuations by means of 2 appropriate procedures. The activity curves are read out logarithmically by a XY plotter and evaluated graphically with respect to the wanted rate constants. Complementary exponential functions are differentiated, read out logarithmically and evaluated in the same manner. In some selected cases it is demonstrated how the measured activity curves can be broken down, interpreted and correlated to the corresponding biological processes. Furthermore, using 2 different and labeled particles further imformation can be obtained in hemodynamic function studies. This set up also allows the registration of processes with rate constants or periods in the msec range. By careful positioning of the detectors above the heart and spleen, the activity fluctuations caused by periodic contractions of the organs can be observed clearly. It was thus shown that under certain circumstances the spleen is able to contract periodically.

3206. A method for measuring cerebral hemispheric blood flow and metabolism - Meyer J.S. and Shinohara Y. - Dept. Neurol., Baylor Coll. Med., Houston, Tex. 77025 - STROKE (N.Y.) 1970 1/6 (419-431)

A new method for measuring cerebral hemispheric blood flow together with metabolism using an injection of a 5 ml bolus of hydrogen saturated saline into each internal carotid artery is described. This method was examined thoroughly in the monkey prior to being used in man. Under fluoroscopic control, a catheter was inserted into each cerebral transverse sinus via the basilic veins. Hemispheric blood flow was calculated from the clearance curves of hydrogen from the transverse sinus following injection using a formula based upon the Stewart Hamilton principle. Hemispheric metabolic index for oxygen was estimated using a new formula by assuming that the distribution of hydrogen into each transverse sinus following injection of the bolus indicates the distribution of the blood from each hemisphere into each transverse sinus. This method has certain advantages over the conventional method for measuring cerebral blood flow, since the actual geometry of the brain in which the blood flow measured is known and simultaneous estimations of hemispheric metabolism are possible. Abnormalities of hemispheric blood flow and metabolism have been measured in 30 patients suffering from various neurological disorders including occlusion of one internal carotid artery. The new formula for estimating hemispheric metabolism is applicable to radioisotopic and other indicator injection methods in which blood is sampled from the cerebral transverse sinuses or internal jugular veins. It was also known that the transverse sinus distribution of blood derived from each cerebral hemisphere varies from one individual to another.

3207. An inexpensive pulse transducer and cardiac tachometer - Roy O.Z. - Nat. Res. Counc., Ottawa - MED.BIOL.ENGINEERING 1970 8/4 (411-412)

There is often a need to obtain the heart rate or to monitor the heart's activity during various operative procedures. In many cases, this need has been satisfied by a pulse transducer which is placed on a digit or other pulsating anatomic location. These transducers are available from a variety of suppliers at the medical grade price. Identical results can be obtained from a transistor radio earpiece. These earpieces have the advantage that they are easy to obtain and are extremely rugged. The transducers shown represent a high impedance crystal type and a dynamic 3000 moving coil model.

3208. A new electrode catheter for intracardiac pacing of markedly dilated ventricles - NEUE INTRAKARDIALE SCHRITTMACHERELEKTRODE ZUR VERMEIDUNG VON DISLOKATIONEN BEI STARK DILATIERTEM VENTRIKEL - Wende U. and Schaldach M. - II. Med. Abt., Allg. Krankenh. St. Georg, Hamburg - DTSCH.MED.WSCHR. 1970 95/40 (2026-2028)

An electrode catheter, introduced intravenously, is described which has small wire hooks at its tip for fixing it to the endocardial surface in case of a markedly dilated right ventricle where it is difficult to maintain contact with the ventricular wall. The catheter is introduced through a guiding catheter so that damage to the tricuspid valve is avoided. Three cases are described in which this catheter was successfully used, after conventional methods had failed to prevent Adams Stokes attacks.

3209. An automatic device for recording blood pressure - Fernandez H. and Robinson III R. - Dept. Neurol., Bowman Gray Sch. Med., Winston Salem, N.C. 27103 - AEROSPACE MED. 1971 42/2 (209-210)

A system for the automatic indirect measurement of blood pressure has been designed. This system makes possible the determination of digital or brachial blood pressure by use of an automatically inflated cuff and a system for detecting Korotkoff sounds.

3210. Post operative variations in the electrophysiology of the epicardial onlay pacemaker lead - Smyth N.P.D., Lekagul S. and Keshishian J.M. - Dept. Surg., Washington Hosp. Cent., Washington, D.C. 20010 - MED.ANN.D.C. 1971 40/1 (12-15)

The function of an unfixed onlay epicardial synchronous pacemaker lead has been studied in the immediate postoperative period in the dog. If pericardial drainage is inadequate there is a risk of early loss of ventricular capture because of accumulation of fluid between the lead and the heart. The exposed coil atrial electrode is mechanically irritating and may cause temporary atrial fibrillation. The electrophysiology of the lead is otherwise comparable to that of a fixed epicardial or myocardial eletrode system.

3211. Design and evaluation of nerve stimulating electrodes - Testerman R.L., Hagfors N.R. and Schwartz S.I. - Univ. Rochester, N.Y. 14620 - MED.RES.ENGNG 1971 10/1 (6-11)

Electrical stimulation of the carotid sinus nerve (CSN) has been used for clinical treatment of hypertension and angina. The present study was undertaken to determine what electrode configurations stimulate the CSN most effectively, and which configurations limit the spread of stimulating current to the surrounding tissue. Two experimental approaches were taken to these problems. First, cross sections of experimental electrodes were drawn on semiconducting paper and the equipotential lines surrounding these models were mapped. Second, experimental electrodes were tested in anesthetized dogs. It was found that guarded bipolar (tripolar) electrodes confined the stimulating current to the electrode through much better than bipolar electrodes did, and there was no significant differences in the effectiveness of the electrode types. It was also found that the surgical placement of the electrode and the amount of connective tissue surrounding the nerve were critical factors in determining the effectiveness of the stimulation.

3212. External synchronization of fixed rate implanted cardiac pacemakers - Bukowiecki B.A. and Stopczyk M.J. - Inst. Cardiol. Med. Acad., Warsaw - MED.BIOL.ENGINEERING 1971 9/2 (121-123)

A possible means for the external electromagnetic synchronization of an implanted fixed rate cardiac pacemaker is described. The method presented can also provide paired pulse stimulation, coupled stimulation and pacing synchronous with a spontaneous heart rhythm.

3213. Equipment for continuous measurements of pulse wave velocities - Weinman J. and Sapoznikov D. - Rogoff Lab. Med. Electron., Hebrew Univ., Hadassah Med. Sch., Jerusalem - MED.BIOL.ENGINEERING 1971 9/2 (125-138)

Equipment that measures continuously 'foot to foot' time intervals between 2 peripheral arterial pulse waves is described. To calculate the pulse wave velocity one has to know, besides this time interval, the distance between the sites of the proximal and distal pulse wave transducers. The foot of the proximal and the distal pulse waves is detected by differentiation and by marking signals generated by a zero crossing marker. These signals start and stop a time interval counter connected to a digital printer and a D/A converter. Gating circuits prevent the operation of the time interval counter by extrema of the pulse wave other than its foot. The accuracy of the differentiator, the accuracy in detecting the zero crossing of the differentiated pulse wave, and the influence of a sloping baseline on the position of the pulse foot, are discussed. In a similar fashion, it is possible to measure the time interval between the R wave and the foot of a peripheral pulse wave. The equipment is being tested clinically. Examples of recordings are given. Cases where the equipment fails to measure, due to peculiarities in the shape of the pulse wave, are pointed out.

3214. The electro acoustic stethoscope: An instrument for the simultaneous auscultation of heart sounds and audio signals - Abelson D. - Dept. Clin. Cardiol., Roy. Postgrad. Med. Sch., London - MED.BIOL.ENGINEERING 1971 9/2 (143)

A simple modification of the standard stethoscope is shown which enables the physician to listen to heart sounds and electrically produced signals simultaneously.

3215. Measurement of the transfer function of the carotid sinus pressure control system with its feedback loop physiologically closed - Suga H. and Oshima M. - Inst. Med. Electron., Fac. Med., Univ. Tokyo - MED.BIOL.ENGINEERING 1971 9/2 (147-152)

The transfer characteristic of the carotid sinus pressure control system was investigated using a method where a pressure disturbance was superimposed on the carotid sinus with the feedback loop left physiologically closed. The transfer function was calculated from the transient responses of the aortic and intrasinual blood pressure. This method produced a result in agreement with that previously reported by another investigator and proved to be useful.

3216. Accurate method for measuring dP/dt with cardiac catheters and external transducers - Dear H.D. and Spear A.F. - Div. Cardiol., Univ. Alabama Sch. Med., Birmingham, Ala. 35233 - J.APPL.PHYSIOL. 1971 30/6 (897-899)

The measurement of the rate of rise of ventricular pressure (dP/dt) requires a recording system of higher fidelity than usually obtained in the cardiac catheterization laboratory. Satisfactory recordings can, however, be easily obtained utilizing standard cardiac catheters and external transducers if the air within the system is displaced by carbon dioxide (CO_2) prior to flushing with saline. In vitro studies utilizing a sinewave generator demonstrated a consistent resonant frequency of greater than 70 cycles/sec using this method, and in vivo comparison with a catheter tip manometer resulted in a correlation coefficient of 0.995. The advantages of this method include its widespread applicability in the standard cardiac catheterization laboratory, its ease of calibration, and its versatility in allowing blood sampling and dye injections through the same catheter.

3217. A technique for fixation of chronically implanted catheters in cats and dogs - Flower R.W. - Appl. Phys. Lab., Silver Spring, Md. 20910 - J.APPL.PHYSIOL. 1971 30/6 (912-913)

A technique is described by which chronic arterial catheter implants may be made in caudal vessels of cats and dogs. Catheter termination is made in a rigid structure affixed to the animal's sacrum in such a way that normal movement is uninhibited and that the animal's attempts at removal are obviated.

3218. Use of a new cardiac output computer for human hemodynamic studies - Leighton R.F. and Czekajewski J. - Dept. Med., Ohio State Univ. Coll. Med., Columbus, Ohio 43210 - J.APPL.PHYSIOL. 1971 30/6 (914-916)

The use of a new on line analog computer suitable for studies of cardiac output performed in the cardiac catheterization laboratory and intensive care unit is described. The instrument derives the area under an indicator dilution curve in two steps, assuming exponential decay of the downslope. Comparison with manual calculations from 128 dye curves confirms the computer's accuracy throughout a wide range of cardiac output values. The calibration procedure is simple and may be performed rapidly. The computer has proved especially useful in clinical pharmacologic studies and in establishing the reproducibility of cardiac output determinations.

3219. The failure of triggered pacemakers - Furman S., Escher D.J.W. and Parker B. - Cardiothorac. Serv., Div. Surg., Montefiore Hosp., Bronx, N.Y. - AMER.HEART J. 1971 82/1 (28-38)

Noncompetitive pacemakers had been expected to prolong pacemaker longevity and reduce patient mortality rates compared to asynchronous pacemakers. Neither has occurred. Mortality rates are equal to those for asynchronous pacemakers and pacemaker longevity has been substantially shorter. Problems unique to triggered pacemakers of electromagnetic interference, pacemaker induced arrhythmias, inadequacies in sensing physiologic signals with bipolar electrodes, and artifacts mimicking the normal cardiac signal produced by normal and partially defective electrodes have occurred. All of these factors have limited the utility and in some instances the safety of triggered pacemakers.

6.9. Reproductive system

3220. The extraction of data from an optical image by scanning - Burn G.P. - Nuffield Dept. Clin. Biochem., Oxford Univ., Radcliffe Infirm., Oxford - MED.BIOL.ENGINEERING 1971 9/2 (87-95)

The Vickers Cytology Scanning Apparatus is described and critically examined to determine how it works and to discover the uses and limitations of scanning methods. Studies were made on cervical smears of the appearance of the scan, the relationship between the pulse width and the dimension of the nucleus, the range of density levels of the nucleus and cytoplasm, the slope at the edge of the nucleus, and on interference by 2 cells in proximity. A theoretical study of conditions at the trigger point showed that the pulse width was a function of the densities of both nucleus and cytoplasm.

3221. The wing sound. A new uterine measuring device - Hasson H.M. - Dept. Obstet. Gynecol., Grant Hosp., Chicago, Ill. - OBSTET.GYNEC. (N.Y.) 1971 37/6 (915-918)

A new sound has been designed to measure the individual lengths of the cervical canal and endometrial cavity as well as to assess the competence of the internal cervical os. In preliminary clinical trials, direct measurement of the human uterus was recorded in vivo in 50 patients. The anatomic data which were obtained appears to have clinical significance.

6.10. Urinary tract

3222. An improved needle set for fistula hemodialysis - Nidus B.D., Matalon R., Deutsch P. and Eisinger R.P. - Dept. Med., New York Univ. Sch. Med., New York, N.Y. - NEPHRON 1971 8/2 (191-196)

An improved No. 16 gauge needle set for fistula dialysis is described. This set enhances successful dialysis by facilitating venepuncture, causing less scarring, and offering lower resistance to blood flow than the No. 14 needle sets commonly used. A technique is presented for connecting a patient's pull and return needle sets so that dialysis may be interrupted.

6.11. Nervous system

3223. First results of studies of a new digital reaction time measuring device - ERSTE UNTERSUCHUNGSERGEBNISSE MIT EINEM NEUEN DIGITALREAKTIONSZEITMESSGERAT - Schmidt F.L. - Sportarztl. Unters. Berat. Stel., Landkreis., Friedberg - MED.MARKT ACTA MED.-TECHN. (Berl.) 1970 18/11 (AM98-AM100)

A new type of apparatus for determination of the reaction time to acoustic and optic stimuli is presented. Owing to the simple construction and easy handling of the apparatus, it is particularly suitable for serial examinations. The reaction times to optic and acoustic stimuli, with distraction by reading, were determined in 180 test subjects in 3 series of 10 determinations. The mean values and standard deviations for the individual age groups are calculated and listed.

3224. The role of the gamma motor system in extensor alpha motoneuron activation during controlled locomotion (Russian) - Severin F.V. - Inst. Problems Informat. Transmission, Acad. Sci. USSR, Moscow - BIOFIZIKA 1970 15/6 (1096-1102)

During controlled locomotion of the mesencephalic cat the triceps surae gamma motoneurons are active when the muscle contracts. Due to this effect the spike frequency in spindle afferents is higher in the stance phase of the step than in the swing phase although the muscle is shorter in the former phase. Mild novocainization of the muscle nerve, i.e. gamma axons block, considerably decreases the spike frequency in muscle spindle afferents during the stance phase. During locomotion the amplitude of the electromyogram of the triceps surae decreases when gamma nerves are blocked.

3225. Analyzer for muscle action potentials - ANALYSATOR FUR MUSKELAKTIONSPOTENTIALE - Kunze K. and Specker K. - Abt. Klin. Neurophysiol. Neurol., Univ. Giessen - ELEKTRONIK 1971 20/1 (9-10)

To facilitate EMG analysis a method for an automatic evaluation of single and repetitive signals is described which - by a combined application of analog computing elements and digital measured value processing furnishes the results rightaway in real time, without recourse to a computer. The result is put out in the form of plain written text and on data carrying media.

3226. A biphasic radio controlled stimulator - Rugh J.D. - Dept. Psychol., Univ. California, Santa Barbara, Calif. - PHYSIOL.BEHAV. 1971 6/3 (267-269)

A stimulator is described which generates biphasic, 100 Hz square wave pulses. The stimulator is small enough to be mounted on the skull of the rat. The stimulator design allows remote control of pulse train duration and interpulse train interval; stimulation current is adjusted by a potentiometer on the stimulator. Some of the difficulties associated with the use of monophasic stimulators are discussed, and it is suggested that the use of radio controlled stimulators may eliminate the problem of crosstalk.

6.12. Receptors

3227. System analysis of optic vestibular interaction in the perception of verticality - SYSTEMANALYSE DER OPTISCH VESTIBULAREN INTERAKTION BEI DER WAHRNEHMUNG DER VERTIKALEN - Bischof N. and Scheerer E. - Max Planck Inst. Verhaltensphysiol., Seewiesen - PSYCHOL.FORSCH. 1970 34/2 (99-181)

CNS processing of vestibular and optic data in the perception of the vertical plane was used to develop a method of cybernetic system analysis. It is suggested that it forms a useful new approach to perceptual psychology. Three subjects continuously adjusted to a vertical luminous rod. The background of the rod was a field of stripes slowly rotating in the fronto parallel plane around the subject's visual axis. The subjects were in different degrees of body tilt when making the adjustments. Data were interpreted using a block diagram model, which was developed in successive steps. Each premise used in the construction of the model is discussed. Essentially, the model can be described by the following propositions: (1) The (approximate) direction constancy of phenomenal space under conditions of head tilt depends on an orthogonal transformation of the phenomenal space coordinates, the direction of the transformation being opposed to that of head tilt ('compensation theorem'). (2) Under the conditions of the experiment, the compensatory rotational transformation is essentially controlled by the vestibular and visual systems. (3) The vestibular system by itself is capable of controlling the rotational transformation; however, its activity is supported by visual influences, which are superimposed in an additive manner ('superposition hypothesis').

3228. An objective test of the sense of smell by means of conditional reflex eye winking (Japanese) - Komatsu A. - OTOLARYNGOLOGY 1970

42/6 (451-455)

Using the conditioned eye winking reflex an attempt was made to record the sense of smell objectively. The stimulus evoking the sense of smell was regarded as conditionai and that for light as non-conditional. The winking movements of the eye-lid were recorded and to elicit the non-conditioned reflex the stroboscope was used for the light supply. For the conditioned reflex of smell the source was increased by 50%. There was very little difference between the results of objective and subjective tests on the sense of smell; threshold tests were in both instances satisfactory.

3229. Masking noise systems in open and closed spaces - Farrell R. - Ranger Farrell Ass., Irvington on Hudson, N.Y. 10533 - J.AUDIO ENGNG SOC. 1971 19/3 (197-201)

Signal to noise ratios (S/N) when close to zero determine speech intelligibility and hence the degree of acoustical privacy between a speaker and a listener. Though S/N is generally used to establish the efficiency of communication systems, it is equally useful in quantifying desired privacy. Factors affecting the signal are voice effort, separating by distance, partial or full enclosure, and sound absorption. Factors affecting noise are traffic noise, air conditioning, and internal activity. The former are controllable, the latter are not. There is, therefore, a need in many instances to electronically generate noise to assure privacy at times when the other noise makers do not provide an adequately low S/N. The design and application of such systems are discussed.

3230. The impact resistance of eye protector lens materials - Wigglesworth E.C. - Australian Def. Sci. Serv., Dept. Supply, Def. Stand. Lab., Melbourne - AMER.J.OPTOM. 1971 48/3 (245-261)

The general experimental conditions for drop ball testing are reviewed and relevant parameters identified and discussed. The effect of variations in commencing height and increment size are demonstrated. Examining the strength of thermally toughened glass and allyl resin (CR39) with dropball tests shows that: Strength increases with lens thickness: for both materials, 3 mm lenses are indicated but 2 mm lenses contra indicated; strength increases with increasing base curvature but, in the range examined (6.00 D base curve - 10.00 D base curve), the effect is small; and mean fracture height increases with decreasing ball size and the relative superiority of 3 mm glass over 3 mm allyl resin lenses diminishes with decreasing ball size.

3231. Analog model for stapes prosthesis evaluation - Longo S.E. and Byers V.W. - Radiat. Ther. Dept., Rawley M. Penick Mem. Pav., Ochsner Med. Cent., New Orleans, La. 70121 - MED.RES.ENGNG 1971 10/1 (12-14)

A mechanical analog system was developed to understand better the role of the acoustic transmission characteristics of prosthetic struts used in middle ear surgery. The proposed model can be a valuable tool in the analysis and design of present and future struts.

6.13. Locomotor apparatus

3232. The present state of development of an adaptive hand possessing fingers and thumb - DERZEITIGER ENTWICKLUNGSSTAND EINER VIELGLIEDRIGEN ADAPTIVEN HAND - Krieger W. - Forsch. Inst. Orthop. Techn., Wien - MED.TECHN. (Berl.) 1970 90/9 (292-295)

The results so far obtained with this functional model of an adaptive hand are fully satisfactory in respect of the various available grips. It is therefore hoped that the proposed mechanical changes and the development of a cosmetically acceptable finger system and metacarpus made of synthetic materials will provide a hand which largely fulfills the common demand for a variety of grips and will give a clearer picture of the true value of the adaptive hand system.

3233. Typewriter with external operation of a keyboard for the feet - SCHREIBMASCHINE MIT EXTERNER ANSTEUERUNG DURCH FUSSTASTATUR - Schauf G. - MED.TECHN. (Berl.) 1970 90/9 (296-297)

The work can be subdivided into the following phases: Selection of a suitable typewriter; determination of the necessary external controls; designing of the external controls; changes of the typewriter and designing of the electronic system; first trials with the apparatus in the rehabilitation center; interpretation of the conclusions of the rehabilitation center; definitive technical conception; design of the apparatus and preparation for serial manufacture. The entire combination has been designed in such a manner that serial industrial manufacture is easy. Great value is attached to experience from earlier cooperation between the Wuppertal institute and industries in the field of automation and the practice oriented cooperation between the different groups working in the field of biophysical prosthetics.

3234. Functioning of human motor units in rhythmical movements (Russian) - Gurfinkel V.S., Surguladze T.D., Mirsky M.L. and Tarko A.M. - Inst. Problems Informat. Transmission, Acad. Sci. USSR, Moscow - BIOFIZIKA 1970 15/6 (1090-1095)

Activity of motor units (MU) of a man carrying out rhythmic movements (RM) at the elbow joint was investigated. MU action potentials were recorded by means of wire electrodes inserted into the biceps muscle. Some characteristics of MU action, viz. the distribution of values of interspike intervals, the cross correlation ratios, and the recruitment order were studied at RM frequencies ranging 0.5 to 4.5 cps. It was found that the frequency of MU firing increased from 11 to 16 imp/sec to 25 to 30 imp/sec as the RM rate was increased, and in some cases the instantaneous frequency reached 50 to 100 imp/sec. When the RM frequency was 4 cps or more, the MU fired doublets with interspike intervals of 30 to 40 msec. If the RM rate was fixed, the MU recruitment order was constant.

3235. The hip disarticulation and short above

knee immediate postsurgical adjustable pylon prosthesis - Zettl J.H., Van Zandt M.L. and Gardner J. - Prosthet. Res. Study, Seattle, Wash. 98104 - BULL.PROSTHET.RES. 1970 Ser.10/13 (64-69)

An improved adjustable pylon prosthesis for immediate postsurgical prosthetic fitting of short above knee and hip disarticulation amputations is described. The system was developed by combining an adjustable above knee and below knee prostheses into one unit. The new pylon prosthesis simplifies the application technique for the rigid dressing and initial prosthetic alignment procedures. It provides significant functional improvements in the gait of the hip disarticulation amputee.

3236. Use of temporary plaster or plastic pylons preparatory to fitting a permanent above knee or below knee prosthesis - Goldner J.I., Clippinger F.W. and Titus B.R. - Div. Orthop. Surg., Dept. Surg., Duke Univ. Med. Cent., Durham, N.C. 27706 - BULL.PROSTHET.RES. 1970 Ser.10/13 (87-107)

A temporary plaster or plastic pylon is helpful in preparing the amputee for a permanent prosthesis, but certain disadvantages of the pylon led to the development and production of a temporary total contact plastic socket with a knee joint, aluminum shin, and foot which has proven to be the most satisfactory preparatory limb. Use of this mechanism and the program that accompanies it is strongly urged and recommended by all prosthetists and physicians prescribing prostheses, provided that they have had adequate instruction in utilizing the total contact above- and below-knee prosthesis. The preparatory prosthesis will allow greater accuracy and flexibility in fitting the final prosthesis and many advantages in the use of the preparatory limb have been noted: It provides a way of assessing patient's ability to use a prosthesis by observing balance, exercise tolerance, cardiac reserve, strength and circulation of the remaining extremity, motivation, and emotional condition. It hastens stump atrophy and provides a stable stump in a much shorter time than has been possible by conventional methods of shrinkage. It allows a period of maturation of the scar, osteophytes, and fibrosis of amputated nerve ends. Phantom pain has been less of a problem in the group of patients who have been fitted with a preparatory prosthesis. It allows an accurate prescription of the permanent prosthesis. It aids the prosthetist in becoming more expert in fitting all kinds of stumps and particularly those that are difficult. It assists in the prevention of knee and hip contractures and diminishes or eliminates mild preexisting contractures at both these joints. It provides a satisfactory mechanism for ambulation immediately or within a few weeks after amputation, and eliminates the psychological and physiological problems associated with prolonged delay between amputation and conventional time of fitting. It provides a physiological means of general body exercise. It serves as a temporary device to allow full activity at minimal cost while means of financing a permanent prosthesis are being obtained. It provides a trial mechanism for assessment of the bilateral amputee. It provides the patient who has had amputation because of malignant tumor a means of early ambulation at minimal cost. It aids the patient in converting from a prosthesis that is proximal bearing to one that has a total contact socket. It serves as a transitional apparatus between the plaster socket used for immediate postoperative fit and the permanent plastic socket provided when the stump has reached maximum shrinkage and stability, without major time or economic loss.

3237. Above knee immediate postsurgical fitting belt - Currell I.J. - Prosthet. Res. Northwest. Univ. Prosthet. Orthop. Cent., Chicago, Ill. 60611 - BULL.PROSTHET.RES. 1970 Ser.10/13 (108-112)

Some of the problems of adequately suspending a rigid dressing are still present, especially on high level above knee amputations and in cases where the patient is obese. There are, however, many benefits derived from this new belt: There is less abrasion to the patient by substituting parachute cord for steel cable. There is greater selection in placing the cords in a parasagittal plane. The belt is made more comfortable by the elimination of buckles. The reduction in its size makes the belt more comfortable and cooler. This belt can accommodate a large range of waist sizes for both left and right amputees.

3238. A list of everyday tasks for use in prosthesis design and development - McWilliam R.P.J.G. - MRC Powered Limbs Res. Unit, West Hendon Hosp., The Hyde, London - BULL.PROSTHET.RES. 1970 Ser.10/13 (135-164)

The report describes a pilot study made as a starting point for the functional specification of powered upper limb prostheses. A list of tasks, intended to cover all the activities of normal adult daily life (excluding jobs or recreations), was compiled. They were scored by a small group of able bodied subjects for importance in independent living, so that design analysis would be simplified by using a restricted number. Opinions differed greatly, but the items have been divided into groups on an approximate scale of importance. The list is presented here in this form.

3239. A basic study in semi buried implants and osseous attachments for application to amputation prosthetic fitting - Esslinger J.O. - 622 North Woodward Avenue, Birmingham, Mich. 48009 - BULL.PROSTHET.RES. 1970 Ser.10/13 (219-225)

It may be possible in the future to penetrate the integument by means of some material such as the Dacron mesh and indirectly attach to bone or to use this attachment for the harnessing of a prosthesis, provided the material is perforated and placed in a subcuticular layer. A satisfactory method for endbearing on a long bone has been shown in experimental animals by the use of a flattened and mushroom shaped, feathered stem, Teflon implant. Some physiologic observations having to do with the effect of increased stress on the osseous prosthetic juncture as the cause of its destruction are pointed out. The need for close attention to preserving the blood supply of the distal end of the long bone is reemphasized, and it is suggested that, even in controlled cases, a delay period be employed between the time of the amputation and the time of insertion of the prosthesis. This has been arbitrarily fixed at 6 weeks, as this would seem to be the period of maturity of periosteal new bone in the average dog. It is hoped that some of these observations may be of benefit, and that those who are able will find a means of integumental penetration which may be permanent and osseous attachment which may be permanent. Phase III of this experiment is predicated on successful completion of Phase I and Phase II, and it has not been embarked upon. Techniques developed here may be of benefit in other integumentary penetration procedures such as dialysis, cardiac pacemaker installations, etc.

3240. Application of Polish computer ANOPS for automatic recording of the histogram of the duration of muscle action potentials - ZASTOSOWANIE POLSKIEJ MASZYNY CYFROWEJ 'ANOPS' DO AUTOMATYCZNEGO ZAPISU HISTOGRAMU DLUGOSCI POTENCJALOW CZYNNOSCIOWYCH MIESNIA - Kopec J. and Hausmanowa Petrusewicz I. - Klin. Neurol. AM, Warszawa - NEUROL.NEUROCHIR.POL. 1971 21/1 (95-101)

An automatic method for recording action potential histograms from muscle using the ANOPS computer is described. The biceps brachii muscle of 72 patients aged 20-25 yr, including controls and cases of myopathy and neurogenic atrophy were examined. The results were photographed directly from the oscilloscope screen. A comparative analysis of the 3 groups using various parameters was carried out. The defects and values of the method are discussed. It is concluded that this method should be used for the study of norms for particular muscles at different ages in patients.

3241. The design of a motility bed including its calibration for the subject's weight - Crisp A.H., Stonehill E. and Eversden I.D. - Acad. Dept. Psychiat., St. George's Hosp., Tooting, London - MED.BIOL.ENGINEERING 1970 8/5 (455-463)

The measurement of nocturnal motility as an index of sleep is discussed. Equipment is described which may be attached to a standard hospital bed for the measurement of motility. The apparatus proved reliable and easy to use. Weight change, common in psychiatric practice, was found to be an important factor influencing motility scores. Calibration of the bed for subject weight enabled a factor to be calculated which corrects the motility scores for changes and differences in weight.

3242. An approach to the dynamic analysis and synthesis of biped locomotion machines - Frank A.A. - Univ. Wisconsin, Madison, Wis. - MED.BIOL.ENGINEERING 1970 8/5 (465-476)

A method for the design of a dynamic biped machine is presented. Initially a minimum energy criterea is assumed. The design of a machine which satisfies this criteria follows. A conflict between this minimum energy design and stability is shown. The design of a more stable dynamic biped machine is then discussed. A set of control laws necessary for the biped's locomotion is derived. This machine is then stimulated on a digital computer. The results demonstrate that the method can be effectively used for the design of prosthetic orthodic equipment and for the analysis of human locomotion.

3243. Human attitude control - Passerello C.E. and Huston R.L. - Dept. Engin. Anal., Univ. Cincinnati, Ohio 45221 - J.BIOMECH. 1971 4/2 (95-102)

Attitude control of the human body in space without the aid of external controlling devices is studied. The human body is modelled by a ten body system consisting of elliptical cylinders and frustrums of elliptical cones. Equations of motion are derived using the principle of conservation of angular momentum, aided by a systematic organization of the complex geometry. These equations are then numerically integrated for three specific cases providing roll, pitch, and yaw motions of the system. A scheme for extending the human body model to an N body system is also presented. Finally, the practicality of human attitude control without the aid of controlling devices is discussed and a concept of a training jig for astronauts is presented.

6.14. Skin

3244. A comparison of skinfold measurements using the Best and Harpenden calipers - Parizkova J. and Goldstein H. - Vzkummy Ustav Telovychany, Prague - HUM.BIOL. 1970 42/3 (436-441)

Measurements of biceps, triceps, subscapular and suprailiac skinfolds have been made on 863 subjects of both sexes aged 6 to 70 years. Each subject was measured once with the Best Caliper and once with the Harpenden Caliper. The readings of the two calipers differed systematically by varying amounts. Linear regression equations are given for each site and sex for converting a measurement made using the Best Caliper to an equivalent Harpenden Caliper value.

6.15. Aerospace medicine

3245. Skeletal function and weightlessness: A mechanism for hypogravic skeletal atrophy - Stubbs D. - Univ. Missouri, Sch. Med., Columbia, Mo. 65201 - AEROSPACE MED. 1970 41/10 (1126-1128)

Recent data from manned space flights have shown a marked demineralization of bone. Such data could be expected as a result of Wolff's Law which correlates bone structure and imposed strain. Presented is a mechanism of bone maintenance as a feedback control system which, when operating under reduced gravity conditions, would predict the observed skeletal atrophy and furthermore, a plateau would be reached after which no further skeletal loss would occur.

3246. Physiological studies of military parachutists via FM/FM telemetry: the data acquisition system and heart rate response - Reid D.H. and Doerr J.E. - Nav. Aerospace Recovery Fac., El Centro, Calif. 92243 - AEROSPACE MED. 1970 341/11 (1292-1297)

The objective is to determine and correlate physiological and force field responses of parachutists to the aerospace recovery environment. Multichannel FM/EM telemetry physiological/force field data acquisition systems were developed. The man borne instrumentation consists of three components (signal conditioning unit, battery package and RF transmitter), weighing less than 5 pounds and mounted beneath the reserve parachute. Microminiaturized 'chip' circuitry utilizing IRIG SCO bands are used with nickel cadmium power supplies and 220.0 MHz FM transmitters. Bisternal ECG electrodes, linear accelerometers and a carbon microphone are man borne sensors. Seven parachutists have participated in 27 free fall jumps to date. Highest heart rates are at manual ripcord pull with a second peak at landing. In one novice jumper heart rate at pull was 220 BPM and at landing 205 BPM. Fifteen jumps later heart rate values had decreased to 170 BPM (pull) and 176 BPM (landing). Heart rates of more experienced parachutists are not as high but the same qualitative pattern is generally observed.

3247. Monitoring the physiological functions of Soyuz 9 crewmembers (Russian) - Zerenin A.G., Sokolov I.V., Talavrinov V.A. and Shadrintsev I.S. - KOSM.BIOL.MED. (Moskva) 1970 4/6 (32-35)

The peculiar feature of physiologic monitoring of the Soyuz 9 mission was the fact that throughout the flight A. G. Nikolayev and V. I. Sevastyanov repeatedly put on and took off the bioinstrumentation harness. These procedures, each lasting 5 to 10 min, were performed without difficulty. The bioinstrumentation harness induced no unpleasant feelings or skin irritations. The telemetered data were of high quality and helped to accumulate reliable information on the cardiovascular and respiratory functions of the cosmonauts during the extended space flight.

6.17. Radiology

3248. General and selective angiography using the conventional exploratory device - ALLGEMEINE UND SELEKTIVE ANGIOGRAPHIE AM KONVENTIONELLEN UNTERSUCHUNGSGERAT - Tolle K.H. and Bange J. - Rontgen Abt., Raphaelsklin., Munster - ELECTROMEDICA (Amst.) 1970 38/6 (350-356)

When no special angiographic installation is available, the ANGIOSIRESCOPE represents an optimal system permitting an angiography of all vascular regions. The displacement in four stages with five fields of radiographic recording enables all the vascular segments from the abdominal aorta right down to the feet to be recorded in a single bilateral femoral arteriography. By employment of a tube of the type Bi 150/30/101 R, which in combination with the 'Siemens special film' provides a focus-film distance of 135-140 cm, it is possible, in conjunction with a stray radiation screen Pb 12/40 and particularly by reason of the continuously reducible recording voltage at constant high tubular currents, to obtain recordings with excellent demonstration of details of all vascular segments.

3249. 3 Dimensional X ray analysis - RENTGENOSKOPIA TROJWYMIAROWA - Nowosielski S. - Kat. Budowy Aparatow Elektromed. Politechn., Warszawa - PROBL.TECHN.MED. 1970 1/1,2 (37-44)

Three methods of spatial observation of opaque structures with X rays are described. The first method consists in X raying an opaque structure from two X ray tubes supplied from a single H.T. transformer. As a result of spatial displacement of two X ray tubes and the mode of H.T. supply, two X ray pictures are obtained which are displaced in space and time. By means of an X ray image amplifier, an electromagnetic switch and a pair of binoculars, the images from one X ray tube are viewed by one eye, while the images from the other X ray tube are viewed by the other eye, which results in a 3 D view of spatial structures. In the second method binoculars are replaced by two TV cameras connected with two TV monitoring units, providing a method of spatial teleradioscopy, which enables one to employ remote control in X ray examinations. In the third method the electromagnetic diaphragm has been replaced by an electric switch in a single TV camera connected to two monitoring units viewed stereoscopically. This also makes it possible to investigate opaque structures in 3 D with X rays.

3250. Thermoluminescence: A better way to monitor radiation exposure - Pearce C.E. - Dept. Radiol., Bethesda Mem. Hosp. Boynton Beach, Fla. 33435 - RADIOL.TECHNOL. 1971 42/4 (259-265)

Of the various methods which have evolved to monitor radiation exposure, thermoluminescence dosimetry holds considerable promise. Its advantages over the more well known methods of detecting radiation amounts, are sufficient to make further investigations into its use of interest to those responsible for radiation dosimetry.

3251. The application of the modulation transfer function to reduce unsharpness in scintigrams - Okumura Y. - Dept. Med. Phys., Mem. Hosp. Cancer Allied Dis., New York, N.Y. - INT.J.APPL.RADIAT. 1971 22/1 (49-51)

This report describes the derivation of a concise mathematical expression for applying the modulation transfer function. An example is presented of this correction applied to a scintiscan of the Picker thyroid phantom. A two dimensional plane was considered because the display of the scintigram is two dimensional.

3252. 'Self volume' standards for Schilling tests and other in vitro bulk liquid counting - Spencer R.P. - Yale Univ. Sch. Med., New Haven, Conn. 06520 - INT.J.APPL.RADIAT. 1971 22/1 (54)

The counting of bulk urine samples, as in a Schilling test, is subject to the multiple variables of geometry (in terms of distance and lateral positioning), sample holder thickness, and contained sediment. The conventional technique of making a standard by placing a similar or identical radionuclide in a separate container, and diluting with water, thus has a number of disadvantages. A new approach is proposed which may overcome these difficulties. The proposal is to add the standard, in soluble form, directly to the specimen that has already been counted.

3253. Basic experiment in stereovoltage radiography. A preliminary report - Scott W.P. and Sydenham Magee M. - Charlotte Mem. Hosp., Charlotte, N.C. - RADIOL.TECHNOL. 1967 39/1 (28-29)

Experimentation into the use of combined energy levels in radiodiagnosis is presented in the form of stereoscopic radiography whereby spatial dimension and tissue absorption are concomitantly achieved. In addition to the stereo phenomenon, there are the advantages of 2 screening films, thus eliminating problems from artifacts and providing freedom from motion because of the rapid exposure time permitted by the high kilovoltage technique which, furthermore, reduces radiation exposure by virtue of its harder beam.

3254. A technique for duplication of roll film angiograms - Kerr E.L. - Cardiac Unit Radiol., Massachusetts Gen. Hosp., Boston, Mass. - RADIOL.TECHN. 1967 39/1 (9-11)

This technique provides a quick and easy method for the duplication of roll film angiograms by using a contact printer. Included in the advantages of this method are: there is no need to cut roll films for duplication purposes; duplicates can be improved by means of dodging; density and contrast may be altered by the exposure time; duplicates may be used for teaching collections and conferences; and a duplicate may be sent to an outside referring physician to demonstrate radiographically the patient's disease without any chance of loss or damage to the original angiogram.

3255. Pulmonary angiography using a flow guided catheter: Construction and applications - Winkler J.B. and Duprey R. - Dept. Med., VA Hosp., Coral Gables, Fla. - RADIOL.TECHNOL. 1967 39/1 (23-25)

Pulmonary angiography using a flow guided catheter is described and catheter construction outlined. Catheter placement, resulting angiogram and pressure correlations are illustrated. In addition to the advantage of pulmonary angiography with a flexible catheter it is possible to introduce this catheter while only monitoring intravascular pressures, to infuse therapeutic agents, to collect blood samples, and to do cardiac outputs.

3256. The technologist's role in roentgenographic and isotopic visualization of the pancreas - Skinner D.J. and Izenstark J.L. - Div. Nucl. Med., Dept. Radiol., Emory Univ. Sch. Med., Atlanta, Ga. 30303 - RADIOL.TECHNOL. 1971 39/1 (1-8)

All methods of visualizing the pancreas with electromagnetic radiation offer some advantages and disadvantages. The radiologic technologist is an important team member in aiding the radiologist to obtain the maximum information from the chosen procedure.

3257. The development and application of multiphase X rays in medical radiography - Morgan J.A. - General Electric Co., X Ray Dept., Milwaukee, Wis. - RADIOL.TECHNOL. 1968 40/2 (57-67)

The basic difference between x ray energy generated in a 2 pulse system operating with single phase electric power and 12 pulse system operating with 3 phase electric power is quantitative. The quantitative difference is sufficient to warrant the unreserved conclusion that 12 pulse generators be used in radiography where the control of involuntary motion is necessary and proper density must be produced with only the use of average kilovoltage. There is only an insignificant qualitative difference in x ray energy produced by the 2 generating systems. The improvement in x ray tube loading provided by 12 pulse x ray generators is actual for instantaneous exposures only; the improvement is nullified when times of one half second or longer are used. The advantages of 12 pulse x ray generators offer an acceptable way of altering conventionally established exposure factors to provide improved radiographic quality.

3258. Producing 35 mm black and white slides from illustrations and cine film - Branham M.L. -1404 W. Edwards St., Springfield, Ill. 62704 - RADIOL.TECHNOL. 1968 39/5 (289-291)

Utilizing the basic procedure described in A Guide for Producing 35 mm. Black and White Slides from Radiographs will allow the photographer to undertake the previously described techniques with reasonable success. Consideration of important factors such as close up lenses, adequate lighting, accurate exposure values and accurate developing is a neccessity for good results. Slides reproduced from illustrations in books and cine film can be beneficial to radiologists and instructors in x-ray technology when presenting papers and lectures. With a minimum of time and equipment, this can be readily adapted in radiology departments.

3259. Fractional focus X ray tubers. Newer clinical and research applications - Cullinan Jr J.E. - Albert Einstein Med. Cent., Northern Div., Philadelphia, Pa. - RADIOL.TECHNOL. 1968 39/6 (333-338)

A review of direct roentgenographic enlargement techniques requiring a fractional focus tube was presented. Newer clinical and research applications are illustrated, including highly detailed vascular opacification studies. These indicate the positive potential for this technique. The use of a film changer for serial magnification studies is discussed and a future body section enlargement technique is suggested.

3260. Multiplanar external beam therapy to the pituitary - Silverman H. - RADIOL.TECHNOL. 1968 40/3 (115-123)

Highly refined treatment plants are possible with a 6 mev. linear accelerator whose gantry provides a rotational accuracy of ± 1 millimeter. Specifically, the treatment of the pituitary fossa is possible with fields of very small dimensions (0.6 to 1.5 centimeters). Doses to the pituitary as large as 20,000 rads can be delivered while the dose to the optic chiasma, which is a little as 2 millimeters away, receives about 4,000 rads, which is considered the tolerance dose in 4 to 5 weeks.

3261. Roentgenographic subtraction technique - Winkler N.T. - Sect. Roentgenol., Mayo Clin., Rochester, Minn. 55901 - RADIOL.TECHNOL. 1968 39/6

(339-346)

Three film methods of roentgenographic subtraction were presented. Subtraction may be defined as a photographic means of removing certain unwanted images from a roentgenogram. Subtraction technique using film is essentially a 3 step process. The technique requires 2 original roentgenograms of the area being examined (a scout roentgenogram and a contrast study) and diapositive printing of one of the original roentgenograms. The diapositive and the original roentgenogram are superimposed, and either the superimposition is viewed directly or a print of it is made. Another method of subtraction technique using a television system requires only the original roentgenograms. The diapositive stage is accomplished by electronic image reversal. Images of the original films are combined, and a subtractive image is displayed on a television monitor. Satisfactory results can be obtained with either the film or the television method. The television method is more convenient but much more expensive.

3262. New trans table cassette holder - Dunn F.H. and Cosby W. - 5940 Forest Park Rd, Suite 101, Dallas, Tex. 76235 - RADIOL.TECHNOL. 1967 39/3 (160-162)

By using this holder, a cassette can be in vertical position ready for x ray exposure in 10 seconds or less. Its application to special views where a horizontal x ray beam is needed helps to obtain the necessary views quickly and easily. The versatility of the cassette holder is demonstrated.

3263. Selection of the mobile radiological unit - Burdick B. - RADIOL.TECHNOL. 1968 39/4 (210-217)

With more and more radiologic technologists being called upon to help in the planning and equipping of x ray departments, there is a greater need for them to have substantial knowledge of the various aspects which enter into such planning. While this article brings a detailed account of planning for a particular type of x ray facility, it may help to point up to all technologists in a administrative position that many factors have to be taken into account in this phase of their work.

3264. The calculation of skin temperature distributions in thermography - Draper J.W. and Boag J.W. - Dept. Phys., Inst. Cancer Res., Roy. Marsden Hosp., London - PHYS.MED.BIOL. 1971 16/2 (201-211)

Before calculating the thermal patterns arising from buried heat sources, the factors which control heat loss from the skin and heat transport within tissue are first reviewed and the relevant thermal constants estimated. The various modes of heat loss from the skin seem to be adequately approximated by Newton's law. Temperature distributions due to conduction from veins and tumors are then derived, using line source and point source models respectively.

3265. Effects of natural and forced cooling on the thermographic patterns of tumours - Feasey C.M., Davison M. and James W.B. - Dept. Clin. Phys., Glasgow - PHYS.MED.BIOL. 1971 16/2 (213-220)

By considering a tumor as a localized heat source of constant heat output, and a blood vessel as a constant temperature source, a study is presented of the effect of natural and forced convection on the surface temperature distribution produced by both types of source at different depths. The effects are derived theoretically and compared with results of measurements on a phantom and on patients.

3266. Effects of input amplitude profile upon diffraction loss and phase change in a pulse echo system - Papadakis E.P. - Panametr. Inc., Esterline Corp., Waltham, Mass. 02154 - J.ACCUST.SOC.AMER. 1971 49/1(II) (166-168)

The particle velocity profile V across the face of a transmitting transducer is shown to have large effects upon the diffraction loss and phase change in the ultrasonic field of the transducer. Various functions V, monotonic decreasing from the center to the rim of a circular transducer, were employed. The pulse echo response of the transducer was calculated by numerical integration on an electronic computer. It was found that the functions V chosen caused the diffraction loss and phase change curves to be smoother than in the piston case and caused the respective peaks and plateaus to shift with distance in the Fresnel region.

3267. Diagnostic X ray standards ready - ELECTRONICS 1971 44/8 (43)

The publication by the Bureau of Radiological Health of performance standards for medical and dental Xray diagnostic equipment is announced. (Klijn - Nijmegen)

3268. Colostomy enema. Description of a catheter nipple device - Land R.E. - Dept. Radiol., Harvard Med. Sch., Boston, Mass. - RADIOLOGY 1971 100/1 (36)

The use of an infant feeding nipple with an enlarged hole through which a soft rubber catheter has been placed is recommended to prevent leakage during a barium enema examination in a patient with a colostomy. The catheter nipple assembly may also be used for cleansing irrigations.

3269. Retrieval of catheter foreign body from the right heart using a guide wire deflector system - McSweeney W.J. and Schwartz D.C. - Dept. Ped., Child. Hosp., Cincinnati, Ohio - RADIOLOGY 1971 100/1 (61-62)

A retrieval system for the removal of a foreign body from the intravascular space using the Muller deflector guide system is described. The size of the catheters involved permits the use of this technique in infants and children.

3270. Dual film pack with tin filter. Aid to mammographic diagnosis - Goldenberg D.B. and Johnston L.W. - Dept. Radiol., Wilford Hall USAF Med. Cent., Lackland AFB, San Antonio, Tex. 78236 - RADIOLOGY 1971 100/1 (184-185)

It is often impossible to obtain an optimum single exposure for all portions of the image in mammography. The authors suggest the use of 2 films separated by an absorbent layer of tinfoil to facilitate simultaneous evaluation of the superficial and deep portions of the breast.

6.19. Monitoring

3271. A compact six channel integrated circuit EEG telemeter - Vreeland R.W., Yeager C.L. and Henderson Jr J. - Res. Develop. Lab., Langley Porter Neuropsychiat. Inst., Univ. California Med. Cent., San Francisco, Calif. 94122 - ELECTROENCEPH.CLIN.NEUROPHYSIOL. 1971 30/3 (240-245)

The lightweight head mounted telemeter described permits artifact free EEG recording during laughter. By utilizing pulse position modulation and reduced battery voltages it has been practical to use integrated circuits without excessive battery drain. Clip on rechargeable battery packs facilitate recording for fairly long periods. The use of low noise pre amplifiers with "micropak" transistors has made it practical to telemeter small amplitude EEGs from normal subjects. Either needle or disc electrodes can be used. Depth electrodes can be used with external attenuators. Since the transmitter is crystal controlled, it has virtually no frequency drift. With the addition of external networks, the telemeter can be used for respiration, electrocardiogram and galvanic skin response recording.

3272. Electrocardiographic monitoring and wave form analysis utilizing interactive computer graphics - Saltzberg S., Haywood L.J., Harvey G. and Vereeke D. - Univ. South. California Med. Cent., Los Angeles, Calif. 90033 - J.ASS.ADVANC.MED.INSTRUMENT. 1971 5/2 (91-96)

The interactive graphics CRT (prototype:IBM 2250) used in conjunction with a general purpose computer (IBM 360-91) makes possible a wide range programming interaction. This system has been used in checking out various programs related to electrocardiographic monitoring, including programs for electrocardiographic pattern recognition for monitoring on line, power spectral density analysis, and digital filtering. Particularly useful is the ability to look at intermediate stages of data acquisition, operation options, and data results. The method lends itself admirably to preparation of audiovisual aids.

3273. An analog preprocessor for use in monitoring arterial pressure - Naylor W.S. - Cox Heart Inst., Kettering Med. Cent., Dayton, Ohio - BIO-MED.ENGINEERING 1971 6/2 (77-80)

An analog preprocessor designed to simplify continuously monitored arterial blood pressure data prior to analysis by a digital computer is described. Two peak reading circuits generate analogs of the systolic pressure and the pulse pressure. The two outputs are then subtracted, to give a third output analogous to the diastolic pressure. This preprocessing reduces the amount of computer time taken up with simple data handling. The system has been tested in 48 hour patient monitoring runs, in which its accuracy compared well with a simultaneously applied digital technique for blood pressure measurement.

3274. Computers and the monitoring of the severely ill patient - ORDINATEUR ET MONITORING DES GRANDS MALADES - Demeester M. - Dept. Physiopathol., Cent. Informat. Med., Hop. Univ., Bruxelles - BRUX.MED. 1971 51/3 (199-201)

Computers can effectively assist the physicians of intensive care units in treating their patients. However, 3 conditions must first be fulfilled: (1) to identify the patients who in principle may be expected to benefit most from computer monitoring of their condition; (2) to solve the problems created by the substitution of a machine for a human being in analysing the data gathered at the bedside: these are technical problems concerned with the manipulation of electric signals, and problems connected with the processing of the information (first to be conceived and then to be programmed into the computer); (3) to construct and test efficacious models of the functioning of the vital systems so as to render possible predictions to be used for guidance in taking therapeutic decisions.

3275. Computers in intensive care - Hugenholtz P.G., Miller A.C. and De Groote V.A. - Thoraxcent., Acad. Ziekenh. Dijkzigt, Rotterdam - HART BULL. 1971 2/1 (5-10)

In the series on the application of computers in cardiology a survey is given of the principles underlying the organisation of Intensive Care Units (ICU). These considerations indicate the expediency of the use of a computer in monitoring cardiac patients for disturbances in rhythm and pumpfunction of the heart. This application is illustrated by a number of specific examples.

3276. Gear loaded heartmobile undergoing trial runs - ELECTRONICS 1971 44/5 (26)

Survey of installed equipment, costs and personnel requirements of heart mobiles. The Washington and Maryland mobile coronary care units are reviewed. (Klijn - Nijmegen)

7. SURGICAL INSTRUMENTS

3277. A new plate for internal fixation - the dynamic compression plate (DCP) - Allgower M., Perren S. and Matter P. - Surg. Dept., Univ. Basle - INJURY 1970 2/1 (40-47)

A system of internal fixation of fractures is presented in which 2 new principles are introduced simultaneously. Titanium is adopted as the material for the plates and screws by virtue of its corrosion resistance and because its elasticity is nearer to that of bone than is that of stainless steel. The second new principle is the provision of sloping cylindrical oval holes in the plate, so that driving home the spherical headed screws applies compression without the need for a separate compressor.

3278. A new drill for the intramedullary insertion of bone pins - VRTAK K NITRODRENOVEMU HREBOVANI KOSTI - Volnohradsky R. - Chir. Odd. Nem., Rymarov - ACTA CHIR.ORTHOP.TRAUM.CECH. 1970 37/5 (309-312)

A description is presented of a new drill facilitating the insertion of intramedullary pins during the open technique for pinning fractures of the femoral diaphysis.

3279. Flexible arm support for the laparoscope - Taylor M.B. - Dept. Obstet. Gynecol., Univ. California, San Diego, Calif. - OBSTET.GYNEC. (N.Y.) 1971 37/6 (918-919)

To permit greater versatility in laparoscopic manipulations, a table mounted, flexible arm support has been designed. The use of this instrument is described.

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2478 Alpert N.R.
1320 Alsmiller Jr R.G.
1667 Alsmiller Jr R.G.
1671 Altes R.A.
2812 Altman H.
622 Altman L.
1769 Altman S.M.
424 Altschuler D.
1213 Alvarado F.L.
3050 Alvarez J.
1162 Alves D'Assumpcao E.
391 Amatneek K.V.
2668 Amazeen P.G.
824 Amend J.F.
2709 Amendt R.O.
877 Ames S.R.
917 Amiot L.
3019 Ammerlaan F.I.A.
1949 Amundsen B.
1617 Andeen C.
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1931 Andersen M.N.
1413 Anderson A.
2033 Anderson A.C.
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649 Anderson D.J.
1187 Anderson E.C.
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898 Anderson J.A.
1295 Anderson R.C.
170 Anderson R.J.
654 Anderson R.M.
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932 Andrews E.T.
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1747 Angell F.L.
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2921 Anken M.
201 Ann Light P.
1853 Anslow A.H.
373 Antinoro F.
1752 Aoki R.
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39 Apter J.T.
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2541 Aquino C.F.
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1078 Arborelius Jr M.
688 Ardila R.
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2430 Ariet M.
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1304 Aristov A.V.
2320 Arkhipov V.K.
971 Arment B.E.
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1667 Armstrong T.W.
2618 Armstrong T.W.
1312 Arnaud J.A.
1790 Arndt R.A.
2731 Arndt R.A.
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1445 Arnold C.R.
469 Arnold J.S.
310 Aronow S.
1359 Aronson C.E.
1086 Arronet G.H.
1103 Arvanitaki A.
3032 Arzbaecher R.C.
826 Asch T.
1245 Ash R.L.
1410 Ashburn W.L.
1191 Ashby W.R.
114 Ashe J.
2356 Ashkenazi Y.
2452 Ashley F.R.
1313 Ashton A.M.
505 Ashton J.P.
3163 Aslan E.E.
3052 Aspinall J.A.
1982 Astley R.
1649 Astlind T.
2407 Aston R.
1321 Astrakhan B.V.
1693 Ata M.
1308 Atakhodzhaev A.K.
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2545 Atlan G.
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2887 Atrens D.M.
2525 Atsuta M.
2998 Attix F.H.
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411 Auble R.L.
414 Auble R.L.
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2011 Augros J.
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1643 Aurich F.
2471 Aurich G.
1301 Avivi P.

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2708 Babinsky A.D.
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1739 Bagge U.
2377 Baglan R.J.
2602 Bahr G.F.
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1736 Bailey I.L.
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1057 Bancroft Jr W.H.
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1224 Barenfeld V.M.
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2929 Barker R.W.J.
1171 Barker W.L.
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37 Barnes C.D.
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630 Baron S.
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1614 Barrett R.
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88 Barry W.
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186 Bassi P.
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406 Bauer D.
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222 Beer Z.
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738 Bellamy N.W.
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745 Bellville J.W.
2308 Belous V.M.
620 Belton G.
1217 Ben Israel A.
575 Ben Tovim N.
2395 Ben Zvi S.
783 Benbenek J.
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1631 Benci S.
1974 Bender L.F.
2309 Benderskii V.A.
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1496 Benedetti G.R.
1631 Benedetti P.A.
2333 Benedikter S.
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2479 Benford J.M.
1517 Bengtson B.
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1394 Benschoter C.A.
1031 Benson E.S.
633 Bensoussan A.
1270 Bentley G.T.
3016 Benvenuto R.
2879 Benzecry R.
1087 Berci G.
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1356 Bergofsky E.H.
977 Bergstedt M.
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927 Berkinblit M.B.
1491 Berkinblit M.B.
2101 Berkinblit M.B.
241 Berkovits B.V.
2432 Berkovits B.V.
2690 Berkow J.W.
2217 Berlekamp E.R.

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183	Berman M.
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472	Bernstine R.L.
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2041	Berry G.
1935	Bertaccini G.
2362	Bertin A.
2792	Besant R.W.
345	Besarab A.
2310	Beterov I.M.
3018	Beumer H.M.
3142	Bevington P.R.
3108	Bevir M.K.
474	Beyer R.T.
647	Beyer R.T.
2035	Bhaskar G.U.
948	Bhatkar V.P.
1008	Bhatnagar G.S.
95	Bhattacharyya B.B.
2050	Bialasiewicz J.
2172	Biancastelli R.
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2266	Bibby D.M.
1398	Bibergal A.V.
115	Bicik V.
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709	Bicknell W.E.
1878	Bidard de la Noe A.
2974	Biermann P.H.
811	Bigelow R.C.
35	Biggs N.L.
733	Billingsley F.C.
41	Bilsen F.A.
1654	Bingulac S.P.
2344	Bingulac S.P.
425	Binnie C.D.
2287	Biran A.
1642	Birge R. R.
13	Birk J.R.
2306	Birky M.M.
3227	Bischof N.
2228	Bishop J.M.
1570	Bishop K.G.T.
1679	Bitz J.P.
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504	Bjork V.O.
494	Bjorndal A.M.
97	Bjornholt J.E.
1444	Black C.L.
515	Blackburn H.
1700	Blackshear Jr P.L.
1222	Blackwell L.H.
2487	Blahd W.H.
2622	Blair F.D.
538	Blair O.M.
420	Blakemore J.S.
2424	Blakemore W.S.
1608	Blanchard J.
35	Blanton P.L.
1136	Blau L.M.
1809	Blauert J.
300	Blazek O.
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224	Bleifeld W.
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2664	Blick E.F.
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36	Bliss J.C.
2009	Blizard D.
3170	Bloch Jr W.N.
2601	Bloch M.
467	Bloch P.
2934	Bloodworth G.G.
2873	Bloomfield D.K.
2761	Blum J.J.
1275	Blythe J.H.
3264	Boag J.W.
163	Bobek S.
2535	Bobo P.
1798	Bobrova M.V.
1130	Bochkarev E.G.
947	Bochkarev V.V.
2354	Bock R.
2482	Boddy K.
3055	Boddy K.
1555	Bodtmann W.F.
487	Boecker B.B.
398	Bogdanov K.Yu.
322	Bogdanski K.
1557	Boggs S.A.
2869	Bohler J.
946	Bohm E.
1937	Bohme G.
2412	Bojsen J.
2649	Bolie V.W.
2291	Bollenbeck P.H.
1374	Bollinger S.F.
2204	Bombi F.
2807	Bonato R.R.
2375	Bonazzola G.C.
1790	Bond J.D.
44	Bongard M.M.
2560	Bongard M.M.
462	Bonne U.
1018	Bonner B.E.
1342	Bonomi A.
1661	Bonte F.J.
1775	Boone C.W.
356	Bootzin D.
1321	Boreiko V.F.
388	Boren H.G.
2483	Bories J.
1884	Bormann M.
3189	Boronkay S.
1871	Borostyan B.
1178	Borst Pauwels G.W.F.H.
756	Borucki W.J.
911	Boscak N.
1663	Boschung P.
2445	Bosel R.
1573	Boshans R.L.
2172	Bosio C.
2700	Bossers G.T.M.
2341	Boster T.A.
2250	Botfield R.J.
228	Both A.
260	Bothmann G.
208	Botsco R.
2549	Botsford J.H.
495	Bottger H.
2209	Bouchareine P.
252	Bouchayer M.
1677	Bouche R.R.
2515	Boucher R.
1959	Bouchoux R.
1883	Bouclier R.
2141	Bourkland K.R.
2580	Bourland J.
1250	Boutot J.P.
450	Bouwhuis G.
590	Bove A.A.
2942	Bowen G.W.
3082	Bowen R.L.
3083	Bowen R.L.
2981	Bowers W.F.
2222	Bowkett K.M.
2818	Bowles B.J.
2885	Bowley A.R.
2377	Bowman C.D.
2574	Bowman C.E.
2326	Bowman G.
84	Bowman M.J.
1345	Boyadjiev L.A.
3092	Boyd C.L.
1394	Boyd J.F.
773	Boyd R.N.
121	Bozic S.M.
2926	Bozic S.M.
2793	Bozzoni E.A.
2438	Braaksma J.T.
421	Bracale M.
692	Bracale M.
1776	Bradford E.
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1909	Bradley E.C.
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2402	Bradnum P.
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922	Brady S.W.
833	Bragg V.C.
2076	Braitenberg V.
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819	Brammell H.L.
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2954	Branch J.D.
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1714	Brandt J.F.
1528	Brandt R.
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2693	Branik G.
2331	Brannen E.
1655	Bransome Jr E.D.
1805	Brash J.I.
2878	Brassard A.
2058	Brauman S.K.
2527	Brauman S.K.
1351	Braun H.
1263	Breeze E.
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1681	Breikss I.P.
1371	Bremer G.
1298	Bremermann H.J.
894	Breskin S.
2375	Bressani T.
2420	Bretschneider H.J.
2619	Breyer B.
2796	Bricker P.D.

2587 Briggs T.L.
1028 Brill A.B.
900 Brin K.P.
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2767 Broad D.J.
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1381 Brockhurst R.J.
2763 Brockway J.A.
1180 Brockwell P.J.
5 Brodersen A.J.
2684 Brody D.A.
2634 Bromley K.
28 Bronk B.V.
446 Brookeman V.
648 Brookman Jr B.J.
104 Brooks C.B.
757 Brooks D.R.
312 Broszkiewicz R.K.
1352 Brotherton J.
1691 Brotherton J.
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2627 Buckland A.
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1248 Buczek C.J.
112 Buczek W.
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216 Budkiewicz A.
1321 Bugarchev B.B.
392 Bugliarello G.
3212 Bukowiecki B.A.
344 Bulfield G.
312 Bulhak Z.
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1024 Bull J.W.D.
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1152 Bunau H.V.
1898 Bungay III H.R.
1825 Burattini E.
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511 Burch G.E.
2422 Burchard D.
3263 Burdick B.
1376 Burian K.
2915 Burke G.
433 Burke J.J.
1606 Burley R.
1990 Burlin T.E.
3220 Burn G.P.
310 Burnham C.A.
384 Burnham R.W.
951 Burns G.K.
1976 Burns M.
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942 Burrows R.G.
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454 Burt W.
122 Burton D.P.
759 Busch G.E.
320 Buschmann W.
1135 Bushong S.C.
3012 Bussmann W.D.
186 Busuoli G.
883 Butler J.A.V.
1195 Butler J.A.V.
853 Butschakliev Z.
3231 Byers V.W.
668 Bykhovskii M.L.
3092 Bynum Jr D.
1506 Byrne J.
2201 Byrne J.

1176 Cabana A.
2970 Caccia F.
1136 Cahill P.
1825 Caianiello E.R.
875 Cain W.D.
1507 Cairns J.A.
223 Calaresu F.R.
1268 Calbick C.J.
2645 Caldin E.F.
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523 Calnan J.S.
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1558 Camp R.W.
1851 Campbell D.E.S.
1852 Campbell D.E.S.
3076 Campbell D.S.
46 Campbell F.W.
1656 Campion P.J.
1137 Camplan J.
1138 Camplan J.
278 Canahl Jr J.A.
62 Candia O.A.
16 Cann J.R.
16 Cann R.L.
701 Cantarano S.
936 Cantraine F.R.
1979 Capotosto Jr A.
726 Capparelli F.
3132 Capparelli F.
1925 Cappelen Jr C.
1448 Caprihan A.
1590 Caprini M.
385 Carbonell A.M.
531 Carden E.
807 Carden E.
1870 Cardus D.
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418 Carlson L.
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2356 Carmi I.
120 Carmody T.J.
148 Carnegie R.
1736 Carney L.G.
2156 Caron P.
42 Carpenter A.
3149 Carpenter G.J.C.
745 Carpenter Jr T.M.
571 Carrasco Zanini J.
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792 Carvalho E.W.
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1708 Casbolt P.N.
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902 Casey R.G.
2757 Caspi P.
1943 Cassara E.L.
969 Cassell W.A.
2237 Cassidy J.C.
2432 Castellanos Jr A.
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2396 Castleman Jr A.W.
2563 Castleman K.R.
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2829 Cathey Jr W.T.
811 Cathey W.T.
1278 Cato J.E.
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15 Chao F.C.

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50 Chen Y.
27 Cheng G.C.
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353 Chesler L.G.
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187 Chilton A.B.
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193 Chisholm G.D.
2318 Chisler E.V.
172 Chiu Y.N.
3173 Chmar W.
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160 Chow J.
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1343 Christian J.R.
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174 Christmas T.M.
206 Chubb L.G.
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399 Chumachenko A.A.
958 Chunin B.A.
175 Churchill G.G.
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1972 Claussen C.F.
588 Clayton C.B.
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307 Clemente G.F.
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3236 Clippinger F.W.
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464 Dreyfus R.W.
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1900 Dysart III B.C.
2696 Dziekan J.
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2655 Earhart C.A.
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1275 Edgcombe K.

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552 Edwards R.Q.
420 Edwards R.V.
224 Effert S.
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